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Wastewater Management Plan for the Lake Washington/Green River Basins

(U.S.) Environmental Protection Agency
Seattle, WA

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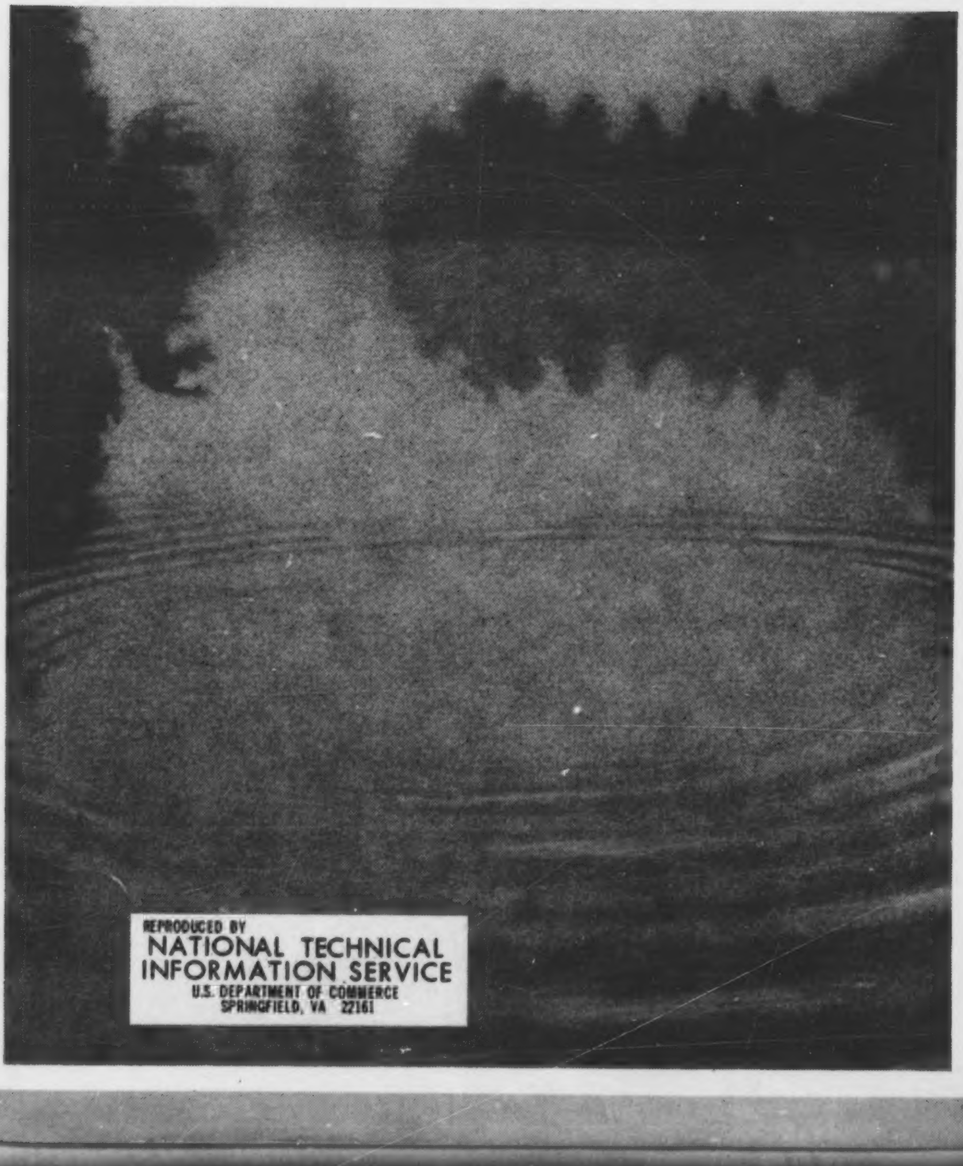
Environmental Impact Statement

Final

Wastewater Management Plan For the Lake Washington/Green River Basins



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In this final environmental impact statement, The EPA proposes to approve for federal funding a long-term wastewater management plan for the Renton study area. The program includes expansion of the Renton treatment plant's capacity, and construction of a tunnel and outfall for treated discharge into Puget Sound. Of the two locations considered for the outfall, Alki Point has been chosen as environmentally preferable over Seahurst Park. EPA also recommends additional studies on the design of the selected route, as well as on the monitoring procedure for the outfall and Puget Sound water quality conditions.

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SEATTLE, WASHINGTON 98101

REPLY TO
ATTN OF: M/S 443

JUL 29 1981

TO: All Interested Government Agencies, Public Groups, and Citizens

I am forwarding for your review and comment this final environmental impact statement (EIS) on the Wastewater Management Plan for the Lake Washington/Green River Basins. The Environmental Protection Agency (EPA) has given the Municipality of Metropolitan Seattle (Metro) a grant for planning needed facilities for treatment and disposal of wastewater from the Renton study area. Metro is expected to apply to EPA for a grant for construction of approved facilities, under Section 201 of the Federal Clean Water Act. EPA has prepared this EIS on its proposed approval of Metro's facilities plan, pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969 and implementing Federal regulations.

EPA will announce the availability of this document in the Federal Register on Friday, August 14, 1981, beginning a 30-day review period. If you have any comments on this final EIS or wish to provide additional information, we would appreciate hearing from you before the close of the comment period on September 14, 1981. All comments will be used by EPA in evaluating the effects of approving the proposed plan. Please send your comments, or requests for additional copies of the draft EIS to:

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Additional copies of this document and supporting appendices are available for review at the EPA Region 10 Library at the above address; at the Metro Library at 821 Second Avenue, Seattle; and at public libraries at Bellevue, Burien, Redmond, and Renton.

Public hearings are scheduled for September 8, 9, and 10 in Bellevue, Alki, and Highline. Locations and times are listed on page ix. I hope you will take the time to give us your views either in writing or at a hearing.

Sincerely,

L Edwin Coate

L. Edwin Coate
Deputy Regional Administrator

ENVIRONMENTAL IMPACT STATEMENT

WASTEWATER MANAGEMENT PLAN FOR THE LAKE WASHINGTON/GREEN RIVER BASINS

Prepared by
U. S. Environmental Protection Agency
Region 10
Seattle, WA 98101

With Technical Assistance from
Jones & Stokes Associates, Inc.
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i (c)

TABLE OF CONTENTS

Page

- FOREWORD i
  - EPA Proposed Action i
  - Rationale for the Proposed Action iii
    - Rationale for Centralized Treatment Plant iii
    - Rationale for Deferring North Service Area Decisions iii
    - Rationale for Diverting Discharge from Duwamish River to Puget Sound iii
    - Rationale for Alternative Puget Sound Discharge Locations iv
  - Proposed Grant Conditions v
  - The Effect of Public Involvement vii
  - General Responses to Most Frequent Comments on Draft EIS ix
    - Wastewater Management Planning Issues xiii
    - Sensitive Areas Issues xiv
    - Construction Impact and Neighborhood Issues xvi
    - Cost Issues xvii
    - EPA Decision-Making Issues xx

- SUMMARY xxv
  - Purpose and Need for Action xxv
  - Description of Alternatives xxvi
    - Background xxvi
    - Long-Term Wastewater Management Alternatives xxvi
    - Other Aspects of the Final Wastewater Management Plan xxviii
      - Near-Term Collection System Projects xxviii
      - Nonsewer Area xxviii
      - Triggering Mechanism xxviii
      - Sludge Disposal xxviii
    - Alternatives Available to EPA xxviii
  - Assessment of Impacts xxix
    - Impacts of Final Plan Recommended Program and Mitigation Measures xxix
    - Comparison of Alternatives xxxiv
      - Alternatives A-3/A-5 xxxviii
      - Alternative A-1 xxxviii
      - Alternative B-1 xxxviii
      - No-Project Alternative xxxix
      - Impacts Common to All Alternatives xxxix
  - Public Involvement xxxix

Page

CHAPTER 1 - INTRODUCTION 1
Metro's Wastewater Management Plan 1
Development of the Wastewater Management Plan 1
EIS Context 3
Major Issues Addressed by EIS 3
National Environmental Policy Act of 1969 (NEPA) Requirements 4
EIS Chronology 5
Subsequent EIS Activities 5
Public Participation 5
Institutional Considerations 6
Laws, Policies, and Agencies Affecting the EIS 6
Clean Water Act 6
Clean Air Act 7
Endangered Species Act 7
Fish and Wildlife Coordination Act 7
National Historic Preservation Act 8
Archeological and Historic Preservation Act 8
Coastal Zone Management Act 8
EPA Policy on Agricultural Lands Protection 9
EPA Policy on Floodplain and Wetlands Protection 9
Affected Agencies and Their Jurisdictions 9
Environmental Protection Agency 0
Corps of Engineers 12
Department of Ecology 12
Departments of Fisheries and Game 12
Department of Natural Resources 12
Puget Sound Council of Governments 12
Metro 12
Counties and Cities 12
Special Districts 13
Existing Sewerage Facilities 13
The Study Area 13
Study Area Wastewater Collection Systems 13
The Renton Treatment Plant 17
Wastewater and Sludge Characteristics 21
Wastewater 21
Sludge 24
Existing Chemical Consumption 24
Existing Energy Use 27
Existing Costs of Wastewater Treatment 29
The Nonsewer Area 29

CHAPTER 2 - DESCRIPTION OF RECOMMENDED PROGRAM AND EIS APPROACH 31

Page

Introduction 31
Process for Selecting Recommended Program 31
Description of the Recommended Program 32
  Effluent Stream 34
  Solids Stream 34
  Effluent Disposal 37
  Costs and Financing 37
  Alternatives for the Nonsewer Area 41
  Triggering Mechanism 43
  Near-Term Collection System Projects 44
Approach to EIS Evaluation of Recommended Program and Alternatives 44
  Program Elements Evaluated 44
  Differences in Impacts Between Recommended Program and Alternative A-3 46

CHAPTER 3 - DESCRIPTION OF AFFECTED ENVIRONMENT 49
Climate and Air Quality 49
  Climate 49
  Air Quality 50
Soils, Geology, and Groundwater 50
  Soils 50
  Geology and Groundwater 54
Water Resources and Water Quality 57
  Inland Surface Water 57
  Puget Sound 57
Biology 61
  Terrestrial Biology 61
  Aquatic and Marine Biology 61
  Fisheries 61
  Species and Habitats of Special Interest 63
Land Use and Socio-Economics 63
  Land Use 63
  Population and Housing 65
  Regional Economy and Employment 65
  Public Services Provision 67

CHAPTER 4 - DESCRIPTION OF ALTERNATIVES 69
Introduction 69
Long-Term Alternatives for Sewer Service Area 69
  Flow Projections and Service Area 69
  Description of 15 Initial Alternatives 71
  Other Long-Term Alternatives for the Sewer Service Area 71
    Alternatives Considered and Rejected by Metro 71
    The No-Project Alternative 78
Description of Screening/Selection Process and Final Alternatives 79

Page

The Selection Process 79
Expanded Description of Final Alternatives 80
Alternative A-1 80
Alternative A-3 84
Alternative A-5 86
Alternative B-1 87
Collection System Changes 89
Wastewater Treatment 92
Solids Handling 92
Effluent Disposal 94
Solids Disposal Alternatives and Costs 97
Current Sludge Disposal Methods 97
Identification of Options 98
Ocean Disposal 98
Conventional Incineration 99
Coincineration 99
Sanitary Landfill 99
Silviculture 99
Soil Improvement 100
Composting 100
Agricultural Use 100
Selection of a Recommended Program 100

CHAPTER 5 - CONSTRUCTION AND SITE-RELATED IMPACTS OF ALTERNATIVES 103
Overview 103
Impacts of Alternatives A-3/A-5 103
Collection System Changes 105
Redmond Connection 105
North Creek/Hollywood Connection 107
Renton Treatment Plant Expansion 108
Description of Existing Environment 108
Assessment of Impacts 109
Solids Handling Facilities 112
Tunnel/Outfall 113
Description of Existing Environment 113
Assessment of Construction Impacts 117
Summary of Major Construction and Site-Related Impacts of Final Plan Recommended Program and Mitigation Measures 126
Impacts of Alternative A-1 128
Differences from Alternatives A-3/A-5 128
Nitrification Facilities 128
Additional Land Required for Solids Handling Facilities 128
Impacts of Alternative B-1 130
Difference from Alternatives A-3/A-5 130
Changes at the Renton Treatment Plant Site 131

	Page
Kenmore Treatment Plant	131
Kenmore Treatment Plant Outfall	131
Construction Employment Impacts	133
CHAPTER 6 - OPERATIONAL IMPACTS OF ALTERNATIVES	137
Introduction	137
Water Quality, Aquatic Biology, and Fisheries	137
Introduction	137
Water Quality	138
Background	138
Impacts of Alternatives A-3/A-5 on Puget Sound	144
Impacts of Alternatives A-3/A-5 on Green/Duwamish River	169
Impacts of Redmond Connection Emergency Bypass	176
Impacts of Alternative A-1	177
Impacts of Alternative B-1	184
Impacts of No-Project	184
Aquatic Biology and Fisheries	185
Background	185
Impacts of Alternatives A-3/A-5	187
Impacts of Alternative A-1	188
Impacts of Alternative B-1	190
Impacts of No-Project	190
Mitigation Measures	191
Short-Term Water Quality and Aquatic Biology Impacts During Project Design and Construction	192
Resource Use	193
Energy Use	193
Chemical Use	196
Mitigation Measures	198
Growth-Related Impacts Resulting from Staging of Alternatives	198
Background	198
Impacts of Alternatives A-3/A-5	199
Overall Flexibility	199
Potential Impacts of the Renton Outfall Tunnel and Redmond Connection	199
Impacts of Alternative A-1	201
Impacts of Alternative B-1	201
Impacts of No-Project	201
Mitigation Measures	201
Reduce Staging Period	202
Base 50-Year Flow Projections on Land Use Plans or PSCOG Forecasts	202
Recreation Opportunities	202

Page

CHAPTER 7 - SECONDARY IMPACTS COMMON TO ALL ALTERNATIVES 205
  Introduction 205
    Relation of Wastewater Alternatives to Growth and Secondary Impacts 205
      Local Recognition of Relationship Between Sewerage Availability and Growth 205
      Growth and Secondary Impacts of a No-Project Alternative 206
    Growth and Secondary Impacts of the Recommended Program 207
    Assumptions for Secondary Impact Assessment 207
    Contents of Chapter 208
  Description and Assessment of PSCOG's Population Projection 208
    Method 208
    Projected Population 209
    Critique 210
    Comparison of PSCOG Forecast to Other Forecasts 212
      EPA Grant Regulations Relating to Population Forecasts 212
      The Bureau of Economic Analysis (BEA) Projections 212
      Status of BEA Projections in the State of Washington 212
      Multiplicity of County and Regional Forecasts 213
  Secondary Air Quality Impacts 216
    Background 216
    Assessment of Impacts 216
    Mitigation Measures for Air Quality Impacts 218
  Secondary Surface Water and Biological Impacts 218
    Secondary Surface Water Quality Impacts 218
      Background 218
      Water Quality Impacts of Urban Runoff 219
      Water Quality Impacts of On-Site Systems 221
    Secondary Impacts on Aquatic Biology and Fisheries 221
      Background 221
      Streams 223
      Lakes 228
    Mitigation Measures for Water Quality and Fisheries Impacts 228
      RIBCO Studies 229
      Metro 208 Plan 229
      Local Plans and Policies 230

Page

- Shoreline Management Act 230
- Summary 230
- Secondary Impacts on Terrestrial Ecosystems 230
- Secondary Groundwater Impacts 231
  - Background 231
    - Treatment Capability of Local Soils 231
    - Major Contaminants of Concern 321
  - Assessment of Impacts 232
    - Analysis of Septic Tank Failure Data 232
    - Risks to Groundwater 233
  - Mitigation Measures for On-Site Systems 234
    - Metro-Proposed Measures 234
    - Determine Groundwater Carrying Capacity 235
    - EPA Role 235
- Secondary Land Use Impacts 236
  - Consistency of the Metro Service Area With Local Land Use Policies 236
  - Prime Farmland Conversion 237
    - Background 237
    - Assessment of Impacts 241
    - Mitigation Measures for Prime Farmland Conversion 244
  - Impacts on Sensitive Areas 247
    - Background 247
    - Assessment of Impacts 247
- Public Service Systems 254
  - Wastewater Management 254
    - Existing Management System 254
    - Existing Capacity Problems 255
    - Impacts of Growth 255
  - Water Supply 255
    - Existing Management System 255
    - Existing Capacity Problems 257
    - Impacts of Growth 257
  - Drainage and Flood Control 258
    - Existing Management System 258
    - Existing Capacity Problems 258
    - Impacts of Growth 258
  - Solid Waste Management 259
    - Existing Management System 259
    - Existing Capacity Problems 259
    - Impacts of Growth 259
  - Recreation 259
    - Existing Management System 259
    - Existing Capacity Problems 259
    - Impacts of Growth 260
  - Social Services 260
    - Existing Management System 260
    - Existing Capacity Problems 260

Page

Impacts of Growth 260
Transportation 261
Existing Management System 261
Existing Capacity Problems 261
Impacts of Growth 261
Electricity and Gas 261
Existing Management System 261
Existing Capacity Problems 263
Impacts of Growth 263
Mitigation Measures for Public Services Impacts 263
Comprehensive Plans 263
Wastewater Management Plans 263
Water Supply 263
Drainage and Flood Control 263
Solid Waste Management 263
Transportation 263
Secondary Impacts on Public Finance 264
Background 264
Responsibility for Provision of Services 264
Fiscal Outlook of the Study Area 265
Mitigation Measures for Fiscal Impacts 267

CHAPTER 8 - EPA ALTERNATIVES AND PROPOSED ACTION 269
EPA Alternatives 269
Overview 269
New Structural Alternatives 269
Administrative Alternatives: Approval and Funding 270
Approve and Fund One Alternative 270
Approve and Fund No Alternative 271
Approve and Fund More than One Alternative 271
Funding of Project Phases 272
Funding Beyond the 20-Year Capacity 272
Administrative Alternatives: Grant Conditions 272
Proposed Action 273
Evaluation of Alternatives 273
Selection of the Preferred Action 275
Rationale for Key Trade-Offs 276
Rationale for Centralized Treatment Plant 276
Rationale for Deferring North Service Area Decisions 276
Rationale for Diverting Discharge from Duwamish River to Puget Sound 277
Rationale for Alternative Puget Sound Discharge Locations 277

Page

Proposed Grant Conditions 278

CHAPTER 9 - COORDINATION 283
- Introduction 283
- Public Participation 283
  - Information Brochure 283
  - Scoping Meeting 283
  - Notice of Intent 284
  - Presentation to Wastewater Plan Citizens Advisory Committee 284
  - Public Meeting on Alternatives 284
  - Public Meetings on Preliminary Plan 285
  - Public Meetings and Hearings on Draft Plan and EIS 285
  - Written Comments on Draft EIS 286
- Schedule for Remaining EIS and Plan Activities 286

CHAPTER 10 - LIST OF EIS PREPARERS 293
- Jones & Stokes Associates, Sacramento, CA 293
- Clean Water Consultants, Santa Ana, CA 294
- Gruen Gruen + Associates, San Francisco, CA 294
- H. Esmaili & Associates, Berkeley, CA 295
- Kahn/Mortimer Associates, Seattle, WA 296
- Hall and Associates, Seattle, WA 296
- University of Washington, Office of Public Archeology, Seattle, WA 296
- University of Washington, Fisheries Research Institute, Seattle, WA 296
- G-ological Drafting Service, Sacramento, CA 297

CHAPTER 11 - BIBLIOGRAPHY 299

CHAPTER 12 - WRITTEN COMMENTS RECEIVED ON DRAFT EIS AND RESPONSES TO COMMENTS 315
- Introduction 315
- Federal Agencies 316
- State Agencies 328
- Regional and Local Agencies 345
- Organizations 376
- Citizens 399

LIST OF TABLES

Table		Page
S-1	Summary of Major Impacts and Mitigation Measures for Final Plan Recommended Program	xxx
S-2	Summary Comparison of Major Environmental Impacts: Wastewater Management Alternatives for the Lake Washington/Green River Basins	xxxv
1-1	Institutional Overview: Lake Washington/Green River Basins	10
1-2	Renton Study Area Local Sewerage Agencies	14
1-3	Existing and Proposed Discharge Limitations for the Renton Wastewater Treatment Plant	18
1-4	Influent and Effuent BOD and SS Quantities	23
1-5	Renton Treatment Plant Effluent Characteristics	25
1-6	Costs of Wastewater Treatment at the Renton Plant	30
2-1	Liquid Stream Design Parameters, 30/30 Effluent	35
2-2	Renton Solids Facilities Design Parameters	36
2-3	General Tunnel/Outfall Information	39
2-4	Cost of Recommended Improvements	40
2-5	Near-Term Collection System Projects	45
3-1	Use and Limitations of Some Dominant Soils in the Renton Study Area	53
3-2	Lake Use Ratings	59
3-3	River and Small Stream Use Ratings	60
3-4	Historic Population Trends, Counties and Major Cities, 1930-1970	66
4-1	Description of 15 Initial Long-Term Alternatives	72
4-2	Potential Treatment Plant Flow Reduction Measures	77
4-3	Metro Rating of Initial Alternatives Against the ALCA to Identify Potential Overriding Benefits	81
4-4	Costs for Redmond Connection and North Creek/ Hollywood Connection - Alternatives A-3/A-5	90
4-5	Costs for Renton Treatment Plant Improvements - Alternatives A-3/A-5	93
4-6	Cost Comparison of Alternative Effluent Discharge Routes	95
4-7	Costs of Candidate Sludge Disposal Systems	101

Table		Page
5-1	Overview of Construction and Site-Related Impacts of Project Components	104
5-2	Existing Land Uses for Tunnel and Open-Cut Alignments	115
5-3	Comparative Lengths of Tunnels	122
5-4	Summary of Major Construction/Site Impacts and Available Mitigation Measures for Final Plan Recommended Program	127
5-5	Total Employment Impacts of Project Alternatives	134
5-6	Employment Impacts of Project Alternatives, by Phase	135
6-1	Estimated Influent and Effluent Concentrations from Proposed Treatment Plants in the Lake Washington/ Green River Basins Study Area	145
6-2	Vertical Density Differences (200 feet vs. surface) at Three Tree Point and Alki Point	148
6-3	Predominate Directions of Winds Greater than 10 mph at Sea Tac Airport	159
6-4	Pollutant Loading Summary of Renton Alternatives and NPDES Data for Puget Sound Discharges from Alki Point South	161
6-5	Effect of Renton Effluent on Heavy Metals Concentrations in ug/l, in Puget Sound	165
6-6	Estimate of Yearly Copper, Lead and Zinc Input to Puget Sound for a Renton Plant Discharging at 100 MGD, Compared to Other Sources at Present Levels	167
6-7	Effluent Limits Estimated by DOE to Protect Water Quality and Average Existing Effluent Concentrations for the Renton Discharge	182
6-8	Interim Measures to Reduce Ammonia Loading to the Duwamish River	194
6-9	Estimated Energy Requirements for Proposed Alternatives	195
6-10	Estimated Chemical Requirements (tons per year)	197
6-11	Long-Term Peak Flow Projections Used to Size Renton Outfall Tunnel and Redmond Connection	200
6-12	Potential Recreation Opportunities Provided by Long-Term Alternatives	203
7-1	Projected Population Increase by Drainage Basin, Renton Study Area, 1980-2000	211

Table Page

7-2 Washington State Population Forecasts and Projections 214

7-3 Comparison of Regional and King County Population Forecasts 215

7-4 Comparison of September 1978 and May 1979 PSCOG Population Forecasts for the Three-County Puget Sound Air Quality Planning Region 217

7-5 Nonpoint Source Pollutant Loading Estimates for Land Use Types in Locations near Kent, Washington 220

7-6 Increase in Urban Acres by Subdrainage Basin, 1980-2000 227

7-7 Forecast of Prime Farmland Conversion 243

7-8 Prime Agricultural Land Mitigation Matrix 245

7-9 PSCOG Projections of Sewered Urban Acres by Subdrainage Basin, 1980-2000 256

7-10 Projected Home-Work/College Trips by Place of Residence and Place of Work 262

9-1 Mailing List for Final EIS 287

LIST OF FIGURES

Figure Page

1-1 Study Area Boundaries 2
1-2 Component Agencies in the Renton Study Area 15
1-3 Local Service Areas, Existing Sewer Service Areas and Metro Collection System 16
1-4 Process Schematic of Renton Treatment Plant 19
1-5 Renton Treatment Plant Wastewater Flows 22
1-6 Pounds of Sludge Pumped to West Point 26
1-7 Renton Treatment Plant Electric Power Cost vs. Time 28
2-1 Recommended Renton Service Area 33
2-2 Proposed Tunnel/Outfall Route 38
2-3 Estimated Future Metro Monthly Rate (Assuming Metro Receives 33% of Available Statewide Funds) 42
3-1 Relative Contribution of Emission Sources - 1977 Inventory 51
3-2 General Soil Associations 52
3-3 Schematic Hydrogeologic Sections of the Lake Washington/Green River Basins 55
3-4 Major Surface Water Bodies in the Study Area Showing Salmon Use 58
3-5 Terrestrial Habitat of Lake Washington/Green River Basins 62
3-6 Urban Land Uses in the Lake Washington/Green River Basins, 1975 64
4-1 Service Areas 70
4-2 Alternative A-1 82
4-3 Alternatives A-3/A-5 (Preferred Program) 85
4-4 Alternative B-1 88
4-5 Alternative Effluent Discharge Routes 96
5-1 Alignment of Redmond Connection and North Creek/Hollywood Connection 106
5-2 Renton Treatment Plant Layout: Recommended Program 110
5-3 Location of Subsurface Corings at Renton Treatment Plant Site 111

Figure | Page
5-4 Alternative Effluent Discharge Routes 114
5-5 East Tunnel Portal 120
5-6 West Tunnel Portal 121
5-7 Renton Treatment Plant Layout: Alternative A-1 129
5-8 Kenmore Treatment Plant Schematic: Alternative B-1 (Conceptual 40-Acre Site) 132
6-1 Subdivisions of Puget Sound 140
6-2 Shellfish Resources Near Potential Discharge Areas 141
6-3 Lower Green-Duwamish River with River Mile Index 143
6-4 Tidal Current Direction and Typical Velocities Near Alki Point 149
6-5 Tidal Current Direction and Typical Velocities Near Three Tree Point (Point Pulley) 150
6-6 Surface Current Directions in Central Puget Sound as Determined by University of Washington Puget Sound Model 151
6-7 Surface Current Studies off Alki Point 154
6-8 Current Studies off Alki Point 155
6-9 Current Studies off Seahurst Park 156
6-10 Current Studies off Three Tree Point (Point Pulley) 157
6-11 Surface Sediments of Puget Sound in Vicinity of Alternative Discharge Areas 168
6-12 Effects of Renton Treatment Plant Alternatives on Dry Seasonal Freshwater Flows in Green-Duwamish Estuary 170
6-13 Observed Longitudinal Profiles of Salinity, Temperature, and Dissolved Oxygen Concentration in the Duwamish River Estuary During the Low High Tide of September 13, 1968 171
6-14 Mean Daily Freshwater Inflow, Tidal-Prism Thickness, and Minimum Bottom DO, at Station 7.8, June-September 1966 172
6-15 Ammonia Concentration at 16th Avenue So., Surface During June to September 173
6-16 Frequency Comparison of Palmer Flows for Tacoma Demands of 76 and 144 MGD 175
6-17 Field Data and Mathematical Modeling Results for Dissolved Oxygen in Green-Duwamish River 180

Figure		Page
7-1	Historical, Current and Projected Phosphorus Loading to Lake Washington	222
7-2	Relationship Between Urbanization and Clean Water Stream Insects (Percent Ephemeroptera, Plecoptera, Trichoptera) in Renton Study Area	224
7-3	Urbanization Impacts on Salmonid Fishery Resources	225
7-4	Map of SCS Important Farmlands and of King County Agricultural Districts	239
7-5	Location of High Growth Subdrainage Basins	248
7-6	Composite Map of Sensitive Areas Within Study Area	249

FOREWORD

This Final Environmental Impact Statement (EIS) has been prepared by the U. S. Environmental Protection Agency (EPA) to describe the environmental impacts associated with EPA's proposed approval of the Municipality of Metropolitan Seattle (Metro) Final Wastewater Management Plan for the Lake Washington/Green River Basins. The Final EIS has been prepared pursuant to the National Environmental Policy Act of 1969 and implementing federal regulations.

EPA's objective in taking action on Metro's Wastewater Management Plan is to assist Metro in meeting the requirements of its state wastewater discharge permit, and thereby work toward achieving the goals of the federal Clean Water Act. EPA will provide financial assistance to implement an approved plan, based on the plan's cost-effectiveness and environmental acceptability.

EPA previously circulated a Draft EIS on Metro's Draft Wastewater Management Plan. Comments on the Draft EIS were received during a 60-day review period extending from December 19, 1980 to February 17, 1981. Five public meetings and two public hearings were held in January 1981 to receive comments from citizens, organizations, and agency staffs. Based on public and agency comment, and additional environmental analysis, EPA has identified a proposed EPA action which is the subject of this Final EIS.

EPA Proposed Action

EPA proposes to approve for federal funding a long-term wastewater management program for the Renton study area, including expansion of the Renton treatment plant's secondary treatment capacity to 72 MGD by the year 1990, construction of solids handling facilities at the Renton treatment plant site, and construction of a tunnel and outfall for discharge of treated effluent to Puget Sound.

Metro's draft plan considered two alternative locations for the Puget Sound outfall: Alki Point and Seahurst Park. EPA finds that, based on environmental criteria alone, excluding costs, Alki Point is an environmentally preferable discharge location. This is due to the greater circulation of Puget Sound waters off Alki, compared to Seahurst, which allows much more rapid dispersion of effluent off Alki. This is important in relation to concern about long-term water quality trends in Puget Sound, especially in shallower embayments.

A plan including a Seahurst outfall has a present net worth cost which is $66 million less than the cost of a plan with an Alki outfall. This EIS has concluded, based on all available information, that no major adverse impacts to Puget Sound can be predicted with a Seahurst outfall. Therefore, EPA considers a plan with a Seahurst outfall to be the cost-effective alternative, and to be environmentally acceptable.

From a technical standpoint, EPA has been unable to conclude that the environmental advantages of the Alki site represent overriding concerns. Such a conclusion would be necessary for EPA to approve an alternative other than the cost-effective alternative. However, this is largely because little can be conclusively stated about long-term cumulative impacts to Puget Sound, especially to the area south of Alki Point, from major municipal discharges. Therefore, the conclusion as to possible overriding benefits of an Alki discharge is to a great extent a judgement about the desired degree of risk avoidance in the face of poorly known future conditions. An Alki discharge would provide a greater degree of certainty that long-term problems would be avoided.

EPA believes that the judgement as to the desired level of risk-avoidance is a decision in which local citizens, acting through their elected officials on the Metro Council, should have a major voice. EPA will therefore make a final decision on potential overriding benefits of an Alki discharge, based on the decision of the Metro Council. If the Metro Council selects a plan with a Seahurst discharge location, and that plan is certified as acceptable by the Washington Department of Ecology, EPA would approve that plan for federal funding. If the Metro Council concludes that the relative advantages of the Alki discharge location are overriding considerations, and selects a plan with an Alki discharge location, and DOE certifies that plan, EPA would consider that as persuasive evidence that Alki has overriding benefits and would approve that plan for federal funding. Due to severe constraints on the availability of federal grant funds for wastewater treatment facilities, EPA does not predict that additional federal funds will be available for an Alki plan beyond what would be available for a Seahurst plan. Therefore, the cost increase of the Alki plan would have to be assumed by state and/or local sources.

Regardless of the selected outfall location, EPA believes that there is a need for additional studies as part of the design of the selected route, and for monitoring of outfall performance and Puget Sound water quality conditions. Various grant conditions and recommendations are presented below which address these concerns.

Rationale for the Proposed Action

Rationale for Centralized Treatment Plant

A centralized plant configuration was found to be less expensive in most cases than a dual configuration including both Renton and Kenmore plants. A centralized system also avoids the construction impacts of a new plant and an additional tunnel and outfall. Further, it reduces the potential for effluent contact with more than one recreational beach area. Although addition of a Kenmore plant and outfall increases overall system reliability and may decrease potential long-term effects on Puget Sound or Elliott Bay, these considerations were not felt to counter-balance the advantages of a centralized system. No major differences between the two configuration strategies were found in the areas of water quality standards, fisheries, or seismic hazards.

Rationale for Deferring North Service Area Decisions

The proposed action would defer the decision on the issue of where to treat future wastewater flows from the North Lake Washington/Lake Sammamish area. That area is presently connected to Metro's West Point plant. Although a decision now would provide greater public certainty about future conditions, a deferred decision offers the possibility of substantial cost savings and a more logical overall wastewater system. Adding the north service area to the Renton system would provide a greater proportion of secondary treatment for regional wastewater. However, leaving that area in the West Point system, in addition to avoiding the costs and impacts of connection facilities and greater operation and maintenance costs, provides more flexibility to respond to changes in service area growth, and discharges more effluent in northward-flowing waters of Puget Sound.

Rationale for Diverting Discharge from Duwamish River to Puget Sound

The overriding factor favoring diversion from the Duwamish River is the ability to avoid water quality standards violations and possible losses to the valuable salmon fishery and to bottom fish. These problems would exist even if nitrification is added to the treatment process. There will not be water quality standards or fisheries problems with a Puget Sound discharge. On the other hand, diversion entails construction impacts from the tunnel and outfall, the possibility of diluted effluent contacting popular recreational beaches, and the need to construct nonmodular facilities sized for 50-year loads. No major differneces were found in the area of cost, assuming a Seahurst discharge, or in the area of long-term Puget Sound impacts. Overall, the judgement of EPA decision makers is that the water quality and fishery concerns, especially considering the greater possibility of plant upset with more sophisticated treatment, outweigh the relatively short-term construction impacts, and the possibility of effluent contacting beaches. No adverse impact to the beneficial uses of beaches is expected from occasional contact with diluted effluent.

Rationale for Alternative Puget Sound Discharge Locations

A Seahurst discharge would experience occasional periods of several days or more of very poor dispersion in which diluted effluent would remain in the central East Passage area, before moving south. Some effluent would probably move into Commencement Bay and south Puget Sound before exiting north through Colvos Passage. With an Alki discharge, there would probably be good dispersion to the north within a few days under all tidal conditions, with little movement of effluent south of Alki Point. An Alki discharge would therefore offer greater protection against any possibility that diluted effluent might contribute over time to cumulative impacts to Puget Sound south of Alki. It is not presently predicted that cumulative impacts could be expected with a Seahurst discharge, but little conclusive information exists as a basis for prediction.

A plan with a Seahurst outfall would be $66 million less expensive, in present net worth terms, than a plan with an Alki outfall. The Seahurst route also would have slightly less construction impact than the Alki route. Although the Alki route has a shorter tunnel length, it would require over 10 miles of open cut construction and would involve more neighborhood disruption. An Alki route has the advantage of providing opportunities for cost sharing with combined sewer overflow control projects, if such projects were undertaken.

The Alki and Seahurst outfall locations appear to be largely equivalent in terms of public health concerns, fisheries, water quality standards, reliability, and seismic or landslide hazards. Overall, the choice seems to be whether the greater long-term risk-avoidance of an Alki discharge is worth its greater cost.

Proposed Grant Conditions

The following grant conditions are intended by EPA to mitigate certain potential adverse impacts identified in this EIS. Several are intended to provide for additional study after selection of the preferred plan. These include conditions concerning additional cultural resources, geotechnical, and oceanographic studies; a construction site plan and site restoration plan; a spoils disposal plan; and a monitoring plan. Other conditions pertain to project construction timing, to ensure that discharge facilities are completed prior to the onset of major new outputs from treatment facilities. Another condition is intended to meet EPA policies on agricultural lands, floodplains, and wetlands, while affirming the authority of local land use agencies over land use planning decisions.

Several additional recommendations are also made which encourage implementation of various ongoing studies.

Proposed grant conditions are as follows:

1. Prior to construction Metro shall ensure that an historical/archeological survey is conducted for the selected tunnel/outfall route and at any other construction sites other than the Renton treatment plant. The results of the survey shall be sent to the State Historic Preservation Officer (SHPO). Any subsequent recommendations by the SHPO shall be formally considered in accordance with requirements of Section 106 of the National Historic Preservation Act. Any SHPO recommendations shall be forwarded to EPA. If cultural resources are discovered during construction at the Renton treatment plant, construction shall stop until a professional archeologist has assessed the significance of the resources.

2. Prior to construction, Metro shall prepare and submit to EPA and the Washington State Department of Ecology its proposed water quality monitoring plan for the Renton Puget Sound discharge. The monitoring plan shall include at least the proposed parameters to be measured, sampling locations and sampling frequency. EPA and DOE shall have the opportunity to review and comment on the proposed monitoring plan.

3. During predesign work, Metro shall conduct detailed geotechnical and oceanographic studies of the selected tunnel/outfall location. The scope of work for these studies shall be made available to the public and shall be submitted to EPA and DOE. These studies shall include, at a minimum, an identification and assessment of soil instability and seismic hazards along the route, based on site specific investigations, and development of siting or construction methods to reduce risks to acceptable levels. The results of the detailed studies shall be reported in a document which will also be available to the public and submitted to EPA and DOE for review. Metro shall hold a public meeting to discuss the results of these studies, and a responsiveness summary for the meetings shall be prepared.

4. Before any EPA construction funds are awarded, Metro shall have an approved sludge disposal plan.

5. Metro shall establish a formal procedure to ensure that, prior to any new interceptor extension or connection to the Renton system, local land use agencies shall evaluate, with public input, the potential impacts of sewered development on environmentally sensitive areas. Those include prime agricultural lands, wetlands and floodplains. The procedures shall stipulate that consideration be given to alternatives that would avoid adverse impacts and recommendations to mitigate adverse impacts.

6. Should connections which transfer wasteloads from the West Point system to the Renton system be found cost-effective in final West Point facilities planning, Metro shall ensure that construction of the selected tunnel and outfall from the Renton treatment plant will be completed prior to completing construction of any such West Point system connection.

7. Before construction, Metro shall prepare a plan, in coordination with EPA and DOE, which sets out the measures that will be taken to minimize adverse impacts to Seahurst Park from construction of the tunnel and outfall if Seahurst is the selected outfall location. The plan shall also include measures that will be taken to complete restoration of the park, after construction is completed. These measures shall be incorporated into construction contracts. The restoration plan shall include an estimate of the time required to complete restoration.

8. Metro shall prepare a spoils disposal plan. The plan shall include specific methods and locations for handling and disposal of spoils from tunnel construction, and shall present measures to minimize adverse impacts from spoils storage and disposal.

EPA additional recommendations are as follows:

1. EPA recommends that appropriate local agencies take every available action to ensure that the facilities plan recommendations for management of on-site wastewater systems in the nonsewer area are implemented. Of specific concern is the need to develop a management system for subsurface system maintenance and solids disposal in King County.

2. EPA encourages Metro to continue to investigate and implement measures to minimize near-term water quality problems in the Duwamish River during design and construction of diversion facilities.

3. EPA recognizes the importance of the "Duwamish Pollutant Inventory" study and recommends that Metro work actively with appropriate agencies to ensure implementation of the recommendations of that study.

4. EPA recommends that PSCOG and Metro work closely together to develop realistic 50-year waste load forecasts for the purpose of sizing nonmodular facilities.

5. The Washington State Department of Ecology has begun a Puget Sound sensitive area study to identify and prioritize sensitive areas, develop a monitoring strategy, and develop DOE program direction, in coordination with other agencies. EPA believes this is an important first step toward gaining an understanding of water quality trends in Puget Sound. EPA encourages DOE to build on this plan by implementing the chosen monitoring strategy, so as to acquire information about long-term Puget Sound water quality conditions, in relation to wastewater discharges.

The Effect of Public Involvement

EPA and Metro received a great many public and agency comments during and following the 60-day review period on the Draft EIS and draft plan. These comments have had a major effect on EPA and Metro decision-making. More attention has been focused on how the plan for the Renton treatment plant fits into the total Metro regional system, on the likely construction impacts of proposed tunnels, on the potential impacts of proposed outfalls on Puget Sound and adjacent beaches, and on the role of residents of the East Passage area in agency decision-making.

The final plan proposes to defer the decision on where to treat wastewater flows from the north part of the service area currently treated at West Point. That decision will be made in the context of planning for the entire Metro system once decisions are finalized concerning level of treatment at the plants presently discharging to Puget Sound.

Additional information has been developed concerning the construction impacts of the proposed tunnel/outfall. This has led to EPA's development of several grant conditions concerning public review of additional predesign studies, and concerning preparation by Metro of a construction site plan and spoils disposal plan.

EPA and Metro have both worked to acquire more information about the proposed outfall's effects on Puget Sound water quality. Studies were done using the Puget Sound model at the University of Washington with simulated Alki and Seahurst discharges, to better assess differences in circulation patterns. A computer analysis of diffuser and effluent plume behavior was completed to confirm the ability to achieve 100:1 initial dilution. Information was gathered on all dischargers to Puget Sound south of Alki Point to determine the relative role of pollutant loading from a Renton discharge. Information was gathered on seasonal water column density gradients near Alki and Seahurst to determine frequency of effluent plume surfacing. Puget Sound sedimentation patterns were investigated to identify areas likely to accumulate settlable materials from the diluted effluent. All of this additional information, presented in Chapter 6 of the Final EIS, has played a key role in the EPA decision process.

The concern by East Passage residents over their voice in the decision has led to an intensification of the public involvement process beyond that normally followed. The comment period on the draft plan and Draft EIS was lengthened, additional meetings were scheduled with East Passage area community groups after the close of the comment period, a full series of meetings and hearings has been scheduled to receive comments on the final plan and Final EIS, and grant conditions have been developed to ensure a community voice in subsequent predesign and design work. EPA feels that these measures have ensured that the affected public has had a major voice in this decision.

A full public review process has been scheduled for the Final EIS and final Metro plan. Over 200 copies of the Final EIS and about 3,000 copies of a summary of the EIS are being distributed for citizen and agency review and comment.

Metro has scheduled a series of public informational meetings on the final plan at the following dates and locations:

Thursday, August 20 - Bothell City Council Chambers
Monday, August 24 - Ober Activity Center, Vashon Island
Tuesday, August 25 - Metro Fourth Floor Conference Room, Seattle
Wednesday, August 26 - Highline High School Cafetorium
Thursday, August 27 - Puget Sound Power and Light Auditorium, Renton
Wednesday, September 2 - Alki Congregational Church

EPA and Metro will hold joint public hearings on the Final EIS and final plan at the following dates and locations:

Tuesday, September 8 - Puget Sound Power and Light Auditorium, Bellevue
Wednesday, September 9 - Alki Congregational Church
Thursday, September 10 - Highline High School Cafetorium

Individuals or groups that wish to comment in writing on the Final EIS may forward written comments to:

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
Attention: Roger Mochnick M/S 443

Comments should be sent by the close of the 30-day comment period on September 14. All verbal and written comments will be considered by EPA in reaching its final decision following the close of the comment period.

General Responses to Most Frequent Comments on Draft EIS

Many written comments received on the Draft EIS raised similar issues and concerns. EPA's general responses to these comments are presented here. The comments are grouped within the following categories: water quality issues, wastewater management planning issues, sensitive areas issues, construction impact and neighborhood issues, and cost issues.

sponses to cost issues were prepared with substantial input rom Metro. All written comment letters received by EPA are reproduced in Chapter 12, along with specific responses to comments.

> 1. *What impacts will an outfall off Three Tree Point (Seahurst Park) or Alki Point have on water quality and beneficial uses at nearby shoreline areas and in the main body of Puget Sound?*

Significant impacts are not expected at either location. The achievable initial dilution of the effluent in the immediate vicinity of the diffuser (100 parts seawater to 1 part effluent) will be great enough to avoid any significant impact on beneficial uses.

Even though adverse impacts are not expected, it is nevertheless possible that underwater geoduck clam beds that are of potential commercial harvest value could be decertified by the State Department of Social and Health Services for commercial harvest. Such beds are found both near Alki Point and Three Tree Point. The Department of Social and Health Services can use decertification as an automatic precautionary measure even when quantifiable public health impacts are not predicted.

Several commentors were concerned about beach wash up of effluent. The "worst case" would be effluent diluted at 100:1 coming into contact with the shoreline. Based on experience at West Point, diluted effluent at concentrations up to about 270:1 may infrequently occur at beaches near the outfall. The oceanographical causes of these occurrences are not completely understood, and it may be impossible to design an outfall and diffuser to completely avoid them. However, these concentrations are not high enough to harm beneficial uses (swimming, shellfishing) at the beaches. The greatest impact may be one of quality of life, i.e., knowledge that diluted effluent may infrequently wash up on beaches.

After initial dilution, the effluent will disperse, become further diluted, and be transported out of Puget Sound by net circulation patterns. Puget Sound modeling studies indicate that effluent discharged off Alki Point would flow predominantly northward, and effluent discharged off Three Tree Point would flow predominantly southward and clockwise around Vashon Island. Diluted effluent would not be trapped in Commencement Bay. Diluted effluent may "pool" somewhat in the Seahurst Park area during neap tides for periods of 4-5 days before being flushed away during periods of spring tides. These differences in circulation between Three Tree Point and Alki Point do not appear to be significant with respect to impacts on water quality, fisheries, or other beneficial uses because initial dilution in the immediate vicinity of the diffuser would be adequate at both locations.

2. *What are the long-term impacts of the Renton discharge off Three Tree Point (Seahurst Park) on south Puget Sound, in relation to the cumulative effects of other discharges to the south sound and the toxic substances recently found in Commencement Bay?*

Long-term degradation of Puget Sound due to treated sewage discharges has not been found thus far, and the EIS has found no evidence for such general degradation in the future. If any general changes are occurring, they are too subtle to be detectable by existing monitoring and studies. The toxic substances recently found in Commencement Bay by National Atmospheric and Oceanographic Administration (NOAA) research appear to be related to discharge of industrial wastes, rather than discharge of treated municipal wastewater. Several agencies, including EPA, are engaged in further studies of Commencement Bay to learn more about pollutant sources and fates.

The pollutant loading, in terms of biochemical oxygen demand (BOD), of the Renton discharge would represent about one-fourth of the total BOD from point sources (discrete municipal and industrial sources) discharging to the south portion of Puget Sound (from Alki Point south). If nonpoint sources (urban runoff, rivers) were considered, the relative contribution of Renton plant waste loads would be considerably less than one-fourth.

Many commentors expressed concern over the cumulative impacts of persistent toxic substances (heavy metals and organics) from the Renton effluent. The Renton effluent, being mainly household wastewater, is relatively low in these substances compared to industrial discharges. The contributions of copper, lead, and zinc from the Renton discharge would be 1 percent or less of the total contributions from all sources of each of these metals to the sound. The main effects of metals will probably be a tendency toward higher metals concentrations in sediments and shellfish and other sedentary invertebrates in the immediate vicinity of the diffuser. Based on experience at other Puget Sound discharges, these impaçts are not expected to be significant. Relatively little is currently known about the concentrations and potential effects of toxic organic substances in Renton effluent and other waste discharges in the sound. Metro is currently conducting a 3-year study of toxicant sources, treatment processes, and fates in the environment. This study will provide a better understanding of sources and concentrations of metals and toxic organics, and may help provide the information necessary to make informed decisions about any toxic control methods that need to be implemented. However, these studies are still unlikely to completely resolve uncertainties regarding the significance of low levels of toxic substances in the marine environment, regardless of the selected outfall location.

3. *Are existing water quality problems in the Green/Duwamish River related to Renton effluent discharge? How serious is the problem now and in the future? If the Renton effluent were removed, would water quality be adversely affected due to less flushing? What would be the cumulative effects of effluent removal, the planned Corps of Engineers dredging project, planned increases in diversions by Tacoma, and the planned Soil Conservation Service Eastside Drainage Project?*

Studies have shown that dissolved oxygen (DO) sags near the water surface in the Duwamish estuary are partially caused by ammonia in the Renton effluent. DO sags in the salt wedge near the bottom have not been linked to the Renton effluent. Surface DO is now at about the minimum level for maintenance of healthy salmon and trout populations. Future decreases in DO would impair the health of the fish populations if Renton effluent continued to be discharged to the river without nitrification. Ammonia levels would become lethal to salmon and trout in a matter of hours during periods of high pH due to algal blooms. Occasional fish kills could occur in late summer or early fall.

Removal of Renton effluent from the river would essentially eliminate the surface DO sags and the threat of ammonia toxicity. The main potential downstream benefit of leaving Renton effluent in the river would be to decrease the residence time of water in the estuary, thereby reducing the amount of oxygen removed from that water by oxygen-demanding pollutants in estuary bottom sediments. However, a report prepared for the Army Corps of Engineers by Harper-Owes states that during low flow periods, when this effect is of concern, tidal exchange rather than freshwater inflow controls residence time. The report concluded that "flow enhancement to 12.2 m^3 per second will not significantly affected wedge residence time or location". Flow enhancement to 12.2 m^3 per second would correspond to leaving Renton effluent in the river. Another potential benefit of higher freshwater flows is to increase turbulence in the water column, which may inhibit the development of algal blooms. On the other hand, leaving the effluent in the river can result in high levels of ammonia, which can become toxic due to the effects of algal blooms. Even if ammonia were removed by nitrification, the Renton discharge would increase river temperature, contribute heavy metals, and could lead to problems of toxicity from either chlorine or sulfur dioxide. In addition, leaving the discharge in the river retains the risk of treatment plant upset, and resulting impacts. On balance, the minor and speculative benefits of leaving the effluent in the river are clearly outweighed by the environmental damage that could result.

Several commentors were interested in the relationship between removal of Renton effluent and the planned Corps of Engineers Duwamish River dredging project, planned increases of water diversions by Tacoma, and the planned Soil Conservation Service Eastside drainage project. The Corps of Engineers studies have shown that the Corps dredging project will not significantly affect DO. Increased Tacoma diversions will not change late summer-early fall flows and hence will not lower salt wedge DO during the season when the wedge inherently has the lowest DO. Upgrading the Renton treatment plant could relate to the upstream Green River flood control planning through either effects of changes in river flow levels from flood control or effects of increased urbanization in the floodplain. Any change in river flow levels resulting from raising levees would not affect flows during the summer when flow effect on water quality and fisheries is of most concern. The Corps has stated that it would not be feasible to make operational or structural changes at Howard Hansen Dam for purposes of flood control.

Increased urbanization in the floodplain is a potential secondary impact of both increased sewage treatment capacity and increased flood control, since absence of either acts as a constraint on urbanization. Ultimately, control over growth and mitigation of growth-related impacts is the responsibility of local government. Federal agencies whose actions remove constraints to growth should work with local agencies to encourage mitigation.

Wastewater Management Planning Issues

4. *Should not a comprehensive wastewater management plan for the East Passage and other south Puget Sound dischargers be prepared?*

Previous regional wastewater management planning for southwest King County was done under Section 303(e) of the Clean Water Act. Although those studies did not establish the assimilative capacity of south Puget Sound or determine maximum pollutant loadings, they did conclude that water quality standards in the sound would be met if municipal wastewater discharges received secondary treatment. Since the proposed Renton discharge will receive secondary treatment, it is considered consistent with previous regional planning.

Monitoring of long-term trends in Puget Sound is planned by both Metro and DOE. DOE is responsible for issuing discharge permits and setting effluent standards. If adverse cumulative impacts were to become evident in the future, DOE has the authority to impose additional discharge requirements on any dischargers in the area, including Metro.

5. *Why is not sludge disposal a part of Metro's wastewater management plan?*

The handling and processing of Renton sludge is discussed in Metro's Wastewater Management Plan, whereas the utilization/disposal of the sludge is being planned in conjunction with Metro's systemwide sludge management program. The sludge handling and processing elements--thickening, digestion, methane gas recovery and dewatering--are designed to yield sludge which is suitable for land application, the preferred method of utilization/disposal.

Metro's sludge management staff is currently preparing a long-term sludge utilization/disposal plan which is scheduled for completion in late 1982. The public will have an opportunity to participate in the preparation of the long-term sludge utilization/disposal plan through a series of public meetings and hearings. EPA will prepare an EIS on the sludge plan which will meet the requirements of the state and national environmental policy acts.

Sensitive Areas Issues

6. *What impacts will population growth and the proposed facilities have on wetlands, floodplains, and agricultural lands? Are the proposed mitigation measures effective and consistent with federal policies?*

The secondary impacts of population growth accommodated by increasing the capacity of Metro's wastewater facilities have been described in Chapter 7 of the EIS. Using the PSCOG population projections used for projecting flows to the Renton plant, Chapter 7 analyzes the impacts of population growth on three important agricultural districts within the study area, and finds that 21-27 percent of the prime farmland within these districts could be urbanized by the year 2000. Chapter 7 also compares the locations of high-growth subdrainage basins to the locations of soil-related sensitive areas, wetlands, and floodplains, and concludes that high-growth subdrainage basins containing large acreages of these sensitive areas could be adversely affected by future growth.

Several commentors expressed concern regarding the consistency of the EIS with EPA policies on agricultural lands, wetlands, and floodplains. These policies, described in Chapter 1 of the EIS, essentially require EPA to assess the direct and secondary impacts of its grant decisions on agricultural lands, floodplains, and wetlands, and to avoid or minimize identified adverse impacts. This EIS complies with these policies by analyzing in considerable detail (in Chapter 7) the adverse secondary impacts of Metro's Wastewater Management Plan, and by describing a number of mitigation measures. Mitigation measures include continuation of existing local plans and policies, or development of new procedures to increase the level of protection. EPA has developed a grant condition designed to ensure that impacts to agricultural lands and sensitive areas are assessed, with public input, prior to hookup of new interceptors to the Renton system.

Concerns regarding the construction impacts of specific facilities in Metro's plan on agricultural lands, wetlands, and floodplains were raised by the U. S. Fish and Wildlife Service and Washington Department of Game. These agencies cited sections of the Draft EIS stating that both the Redmond connection and the North Creek/Hollywood connection would pass through agricultural lands and sensitive areas, and that the river crossing of one of the Alki Point tunnel/outfall alignments would be near Kellogg Island, an important wildlife habitat. New mitigation measures for construction impacts of the Redmond connection, North Creek/Hollywood connection, and Alki Point tunnel/outfall route do not appear necessary as part of this EIS. The Metro recommended program defers the decision on construction of the Redmond connection or North Creek/Hollywood connection. Impacts of these facilities may be avoided. If the decision is subsequently made to construct the Redmond and North Creek/Hollywood connections, Metro would seek an additional construction grant, and EPA would develop appropriate mitigation measures as grant conditions for site-specific sensitive areas impacts. Mitigation measures for impacts to Kellogg Island do not appear to be necessary at this time, since the most likely Alki route, Route D, would avoid Kellogg Island.

Construction Impact and Neighborhood Issues

7. What are the seismic and geologic risks associated with alternative routes to Puget Sound?

Soil stability and seismic hazards are risks that would be encountered with construction of a tunnel/outfall to Puget Sound. In general, surface soil instability is associated with two potentially hazardous conditions: erosion hazards, and slide and slippage hazards. Construction in hazardous areas could occur in the vicinity of the following three areas: along the open-cut pipeline corridors, adjacent to the tunnel portal areas and at the pump station site.

Based on King County's mapping of sensitive areas, the proposed pipeline and tunnel alignments do not encounter any designated erosion hazard areas. Slide and slippage (landsliding) hazards, however, do occur along the proposed alignments. King County designates potential landslide hazards based primarily on slope inclination greater than 15 percent. In addition, the physical character of the subsurface material is considered.

The coastal shoreline in the Three Tree Point area has been designated by King County as a moderate to serious landslide hazard area, and similar conditions are likely to exist at Alki Point as well, based on slope considerations. Therefore, the design and construction of facilities in the coastal zone, such as the proposed pump station, will have to take landslide hazards into account. Because tunnel portals and the pipeline adjacent to the Duwamish River could also encounter landslide hazard areas, such facilities must be designed and constructed with these factors in mind.

Regarding seismic risks, the entire Puget Sound basin is classified by the U. S. Geological Survey as a Zone 3 seismic risk area indicating high seismic activity. This classification is characterized by a history of major earthquake frequency and associated damage. Several earthquake faults are known to exist within the Puget Sound area including a recently discovered fault which runs through Alki Point. This fault, however, is considered to have been inactive during recent years.

A precise determination of geologic and seismic risks cannot be made until predesign engineering and geotechnical studies are completed by Metro. Facilities will be designed to withstand frequent events and to fail safely in the extreme but rare event. Metro's engineering consultant has experience in designing tunnels in areas of even higher seismic risk than Puget Sound. EPA has recommended analyses to be conducted in predesign studies to mitigate geologic and seismic risks, and will include these recommendations in a grant condition for funding the Metro plan. If the determination is made in predesign studies that the recommended Seahurst Park route is not feasible from the standpoints of cost, engineering, or design, and Metro subsequently selects another route, then a supplement to the Wastewater Management Plan and EIS would be prepared and distributed for public review.

8. *What are the impacts of the tunnel and outfall to Puget Sound on neighborhood property values and quality of life?*

Properties adjacent to the tunnel portals and open-cut areas would be subject to adverse construction-related impacts such as noise, traffic disruption, increased truck traffic and dust during the construction phase. These construction conditions would last no longer than 27 months. and the physical environment would eventually be restored. Marketing of property during the construction phase could potentially be more difficult, but this would be a short-term effect that would end once construction is completed.

Several individuals have asked whether the mere existence of an outfall which discharges effluent might adversely affect property values. In the absence of demonstrable on-shore impacts of an outfall, it is highly unlikely that property values would be affected. Data in the Final EIS indicate that present beneficial uses of the shoreline and coastal waters would not be affected by such occurrences.

Quality of Life is a subjective and elusive concept. Other than short-term construction impacts, there is no objective evidence in the EIS that present beneficial uses of Puget Sound waters along beaches would be affected by the discharge of Renton effluent to the sound. However, the mere knowledge that diluted effluent may infrequently wash up on beaches could, nevertheless, diminish perceptions of the quality of the shoreline environment for some residents.

Cost Issues

9. *Could cost sharing with other Metro facilities reduce the cost of Alternative A-5?*

Pages 50 and 51 of Metro's final plan contain a discussion of the cost sharing potential with other Metro projects. Figure 2-17 in the plan contains an estimate of the potential savings associated with cost sharing with other pojects. The conclusion reached is that the Seahurst Park outfall is still $32.2 million less expensive than an Alki Point outfall even if all potential cost sharing projects are incorporated into a joint program. Of the $52.5 million potential savings associated with the Alki tunnel, $38 million is assigned to the Duwamish treatment plant outfall, $4.5 million is associated with the Alki treatment plant phase-out, and $10.0 million is associated with CSO control projects. In order to "save" this money, Metro would have to spend an additional $143 million. Even then it would be less expensive to separately construct these projects with a Renton effluent tunnel to Seahurst and a Duwamish effluent tunnel to Alki.

10. *How will rates for paying for the plan increase over time?*

Metro's projections for rate increases over time are presented in Chapter 2 of the Final EIS. The rate increases are a function of the Renton plant improvements, the amount of state/federal grant funding available, and decisions to be made concerning Metro's Puget Sound plants. If Metro receives 33 percent of available statewide funding, and implements a "full utilization" of West Point treatment plant's primary capacity, monthly rates would increase from $4.50 in 1981 to $15.00 in 1990. The portion of this increase attributable to improvements at the Renton plant alone is about $6.00 per month in 1990.

11. *How accurate are the draft plan cost estimates? What is the probability of cost overruns for the proposed tunnel?*

Metro has indicated that the accuracy of the cost figures contained in the draft plan is plus or minus 20 percent. The cost estimate accuracy range has been "skewed" to -10 percent/+30 percent by adding a 10 percent allowance. Included in the cost estimates are a miscellaneous "contingency" allowance of 5 percent, 20 percent for engineering services, and 5 percent for administration and finance costs. Thus a total of 40 percent has been added to the actual construction and operation and maintenance budget estimate.

Metro has indicated that the tunnel cost estimates are also generally accurate to within ±20 percent, skewed for a range of -10 percent/+30 percent. A similar 40 percent is added to the actual construction and operation and maintenance budget estimate to account for construction contingencies, engineering, contract administration and finance costs. The actual tunnel construction costs are from cost curves based on records maintained by Metropolitan Engineers for Metro facilities, construction project reports containing cost data, and bidding prices and estimates from other West Coast wastewater facilities. The cost curves are for soft ground tunneling techniques and include support plant and equipment, excavation, dewatering, construction support system, concrete lining, grouting, cleanup and contractor's overhead and profit. The engineers' staff geologist has reviewed surficial geological information and extrapolated it beneath the ground. This revealed that the majority of the Alki and Three Tree Point/Seahurst Park tunnels would be in gravel, soft sandstone, shale and conglomerate. One hard rock section, which has been identified near the eastern portal of the Three Tree Point/Seahurst Park portal, would require a different tunneling technique, but cost estimates would be unaffected.

Actual tunnel costs could differ from the estimates depending on geological conditions along specific routes, the construction method, the existence of mixed face conditions, overlying shear zones, groundwater conditions, allowable length of construction period, the availability of portals and access points, and precise tunnel alignments. More detailed cost estimates will be prepared following geotechnical investigations, including test borings and geophysical work (seismic and downhole logging techniques).

12. *What portion of the new facilities is required to service future users? What proportion of costs will be paid by new users? Is the proposed cost allocation equitable?*

The proposed project will serve existing and future domestic/commercial and industrial users. Metro has estimated that 100 percent of the expansion in treatment plant capacity is attributable to growth; of these costs, 77 percent are attributable to new domestic/commercial users and 23 percent to new industrial users. About 74 percent of the solids handling facilities capital costs are attributable to existing users, with the remaining 26 percent attributable to new users (13.5 percent domestic/commercial, 12.5 percent industrial). For the tunnel/outfall, Metro estimates that 62 percent of the costs are attributable to existing users, with the remaining 38 percent attributable to new users (36 percent domestic/commercial, 2 percent industrial).

Overall, Metro estimates that about 56 percent of the recommended program capital costs are for existing users and 44 percent for future users. For operation and maintenance costs, both existing and new users will be paying identical monthly fees, a portion of which will be used for operating and maintaining the new facilities. Metro has high strength and high volume surcharges on industrial users to help ensure the industrial users pay their proportionate share of costs.

Metro staff believes that the existing rate system is generally fair and equitable. Whether the rate structure should be re-evaluated is a major policy issue which is being considered by the Metro Council as they review the wastewater management plan. The existing rate system requires that all Metro rate extensions of interceptor sewers to the core system be paid for by the new customers being served. Each household connected to the sewer system pays Metro $4.50 per month. Of the $4.50 that comes to Metro, a portion is used to pay for operation and maintenance of existing facilities. The remainder of the monthly fee is used to pay off the revenue bonds which were sold to finance the construction of the Metro system.

EPA Decision-Making Issues

13. How does the EPA decision-making process work? What is EPA's relationship with Metro?

Under Section 201 of the federal Clean Water Act and its implementing regulations, Metro, as an applicant for grant funding, prepares a facilities plan and submits it to the state and EPA for approval. EPA offers federal grants for the planning (Step 1), design (Step 2), and construction (Step 3) of publicly-owned treatment works. Federal funding for design and construction is dependent on EPA approval of the facilities plan. Previously, Metro applied for and received EPA funding to prepare the facilities plan. When complete, the plan will be approved by the Metro Council, certified by the state, and submitted to EPA.

EPA bases its decision whether to approve the facilities plan for funding on Metro's satisfaction of requirements for a complete facilities plan (40 CFR Part 35.917-1) and requirements for a complete grant application (40 CFR Part 35.920-3). In addition, EPA approval is based on the water quality-related need for the project, cost-effectiveness of the applicant's preferred alternative, its environmental soundness, its reasonableness and feasibility, the applicant's ability to implement the plan, adequate public participation, and state certification of the preferred plan.

To determine environmental soundness in a plan for major facilities, EPA may independently prepare an EIS under the National Environmental Policy Act, as part of its decision to approve a plan. The EIS helps EPA analyze the impacts of alternatives, including that preferred by the grantee, and other alternatives developed by EPA as necessary. The EIS is prepared by EPA, with its own technical consultant, rather than by the grantee, to allow EPA to take an objective look at the environmental impacts. EPA reviews all pertinent information, including information available from the grantee. Note that this procedure differs from that under Washington State's Environmental Policy Act (SEPA), in which a private party often prepares an EIS on a proposed development, for approval by a state permitting agency. Under EPA's procedure, there is no separate "approval" of the EIS other than through refinement of the EIS based on public review and comment. Therefore, there is no conflict of interest in EPA both preparing the EIS and using it to help make a decision whether or not to approve Metro's facilities plan.

If EPA did not approve the facilities plan, Metro would either modify the plan as necessary to gain EPA approval, or seek funding elsewhere. The purpose of concurrent preparation of the plan, by Metro, and the EIS, by EPA, is to resolve any differing views on the best alternative in advance of final agency decisions, so that unnecessary delays can be avoided.

14. *Why were East Passage residents not involved earlier in the public participation program? Does lack of sufficient public participation by these residents invalidate the Wastewater Management Plan and EIS?*

EPA believes that East Passage residents have had substantial opportunity to review the Draft Wastewater Management Plan and EIS, and make known their questions and concerns. A public meeting on the draft plan and EIS was held in Burien on January 13, 1981 specifically to obtain input for East Passage citizens. Over 175 citizens attended that meeting. East Passage residents have also had the opportunity to formally comment on the draft plan and EIS at public hearings, and in writing to Metro and EPA; most of the citizen letters EPA received on the Draft EIS were from East Passage residents. In addition, Metro and EPA staff attended a number of community group and agency meetings in the East Passage area in February, March, and April of 1981 to explain the draft plan and EIS and to receive comments.

A number of comments received from East Passage residents express disappointment that the residents were not consulted earlier in the planning and environmental review process; some residents stated they did not learn of the plan or EIS until the time of the public meeting in January 1981. It was not until relatively late in the planning process that Three Tree Point/Seahurst Park was selected as a potential site for the Renton tunnel/outfall and EPA agrees that additional efforts should have been made to obtain earlier input from East Passage residents. Nevertheless, EPA believes that substantial input has been obtained from East Passage residents to allow an informed decision, through the mechanisms described above.

Participation by East Passage residents has made up in sophistication and volume, for any deficiencies due to lack of early notification by EPA or Metro. It is improbable that additional time for comments by East Passage residents could have improved on the substance of the comments that were received, or brought additional information to light which would affect decision making more than it has been affected already. Also, a full public review period has been set up for the final plan and Final EIS to further enable all interested citizens to express their views prior to final decisions. This review will occur predominantly in the East Passage area.

15. Is sufficient information available to select a preferred tunnel/outfall location?

For any important decision it is best to have as much information as possible. However, perfect knowledge is never available, and is not really a prerequisite to a good decision. What is required is enough information to clearly distinguish among the available alternatives. Developing more information prior to making a decision may be superfluous if it does not help in deciding among alternatives. Also, information is expensive to acquire, both in time and money. It is better to perform expensive detailed studies necessary to refine the project design only on the selected alternative.

In this case, EPA feels that enough information is available to identify Seahurst Park as the cost effective and environmentally acceptable outfall site. The key is to retain the capability to reconsider the decision if unanticipated information comes to light in the detailed studies, and to monitor the operation of the outfall to gain more knowledge of long-term effects. We believe we have these capabilities. EPA review of the results of design studies is provided for by a condition to the EPA grant, and Metro has committed to a monitoring program.

Information resulting from detailed predesign studies, such as geotechnical and oceanographic studies, will be carefully reviewed by Metro and EPA. If these studies were to produce unanticipated information which could alter our preference for the selected alignment, the original tunnel/outfall decision would be re-evaluated and other alignments considered. In that case, a supplemental EIS would be prepared and circulated for public review and comment prior to any change in the decision on tunnel/outfall location. Public meetings also would be held. If the decision were changed, new detailed studies would most likely be conducted at the new location.

SUMMARY

( ) Draft Environmental Impact Statement

(X) Final Environmental Impact Statement

Type of Action: Administrative

Purpose and Need for Action

The Municipality of Metropolitan Seattle (Metro) is expected to apply to the U. S. Environmental Protection Agency (EPA) for grant funds to design and construct improvements to the Metro Renton treatment plant sewerage system. Metro has prepared a Final Wastewater Management Plan for the 620-square-mile Lake Washington/Green River Basins study area for three major reasons: (1) the Renton treatment plant and other facilities have reached their operating capacity and need expansion to accommodate future growth; (2) increasing quantities of secondary effluent from the Renton plant are being discharged to the Green/Duwamish River, and near-term ammonia, dissolved oxygen, temperature, and chlorine problems can be forecast during low flow periods; and (3) much new development within the study area will be using on-site technologies, and these systems have the potential to adversely affect water quality.

This EIS focuses on three major issues associated with the Metro plan:

Costs:	What are the comparative costs and financial effects on users of the various near-term and long-term alternatives considered by Metro?
Water Quality:	What are the water quality and biological trade-offs of continued discharge of Renton treatment plant effluent to the Green/Duwamish River compared to discharge to Puget Sound? What are the water quality impacts, if any, of on-site systems in the less developed portions of the study area?
Land Use:	What are the land use impacts of wastewater management alternatives for the study area, and what impacts will growth accommodated by facilities expansion have on water quality, agricultural lands, sensitive areas, air quality, and public services and finance?

Description of Alternatives

Background

The Renton treatment plant has the capacity to treat an average of 36 million gallons per day (MGD). The treatment plant has been operating in a stressed mode for the past 2 years as wastewater flows have approached and exceeded the 36 MGD capacity; flows during the first quarter of 1980 were above 40 MGD. The plant is generally meeting its discharge limitations, however, because it was designed with several back-up measures which provide reliability during higher flows.

Flow projections for wastewater management planning were based on the "policy" population projection prepared by the Puget Sound Council of Governments (PSCOG). PSCOG projects that the study area population will increase from 537,087 in 1980 to 805,000 in the year 2000, of which 631,000 will be sewered. Allowing for domestic flow, industrial flow, and infiltration and inflow, Metro projects a year 2000 average wet weather flow of 101 MGD. This projection includes flows from the north part of the study area, which is currently served by Metro's West Point plant.

The proposed sewer service area for Metro's plan consists of those lands which are presently authorized to receive sewer service by local land use plans or policies. The remainder of the study area (the nonsewer area) consists of lands for which long-term land use is certain (where local policies indicate sewer service should not be provided), and lands for which long-term land use, and thus long-term sewer service, is uncertain (lands where there is no clear local policy guidance). The proposed service area map is consistent with local land use plans and policies, according to an analysis done as part of this EIS.

Long-Term Wastewater Management Alternatives

Metro initially developed 15 long-term alternatives, which are variations on three basic concepts: expansion of the Renton treatment plant to process all wastewater generated in the sewer service area (example Program A), expansion of the Renton plant and construction of a new plant in the Kenmore area (example Program B), and construction of six satellite plants in addition to the Renton expansion and Kenmore plant (example Program C). Variations on these concepts relate to level of treatment at the Renton plant (secondary vs. nitrification vs. advanced waste treatment) and to receiving water for Renton effluent (Green/Duwamish River vs. Puget Sound).

Four final alternatives were selected by Metro for further consideration following a screening process. These alternatives are Alternative A-1 (centralized processing at Renton plant with nitrification and continued discharge to the Green/Duwamish River), Alternative A-3 (centralized processing at the Renton plant with discharge of secondary effluent to Puget Sound off the Point Pulley area), Alternative A-5 (same as A-3, but discharge off Alki Point), and Alternative B-1 (similar to A-1, but with construction of a new secondary treatment plant in the Kenmore area to treat sewage from the north part of the study area).

Following further evaluation, Metro staff selected Alternative A-3 or A-5 as the preferred long-term wastewater management program (these alternatives differ only in the Puget Sound outfall location) in its Draft Wastewater Management Plan. Components of the preferred program included: collection system changes (construction of the Redmond connection and North Creek/Hollywood connection to convey wastewater from the north part of the study area to the Renton plant); expansion of the Renton treatment plant to 99 MGD; construction of a tunnel and outfall to convey effluent to Puget Sound at either Three Tree Point or Alki Point; and installation of solids processing facilities at the Renton plant (Renton sludge is currently discharged via a force main to Metro's West Point plant).

In its Final Wastewater Management Plan, Metro has recommended a selected tunnel and outfall route to Puget Sound; the selected route would discharge treated effluent via a 3,000-foot outfall off Seahurst Park. The final plan recommended program calls for expansion of the Renton treatment plant to only 72 MGD (versus the 99 MGD recommended in the draft plan). The reduction in capacity reflects Metro's deferred decision on whether to continue to serve sewered areas currently tributary to the West Point treatment plant at that plant, to divert these flows to the Renton plant, or to construct a new Kenmore plant. If the West Point service area flows were not transferred to the Renton plant, collection system changes (Redmond and North Creek/Hollywood connections) originally proposed in the draft plant would be avoided.

This EIS emphasizes the environmental impacts that would occur if Alternatives A-3/A-5 were implemented, primarily because Alternative A-3 is a possible consequence of implementing Metro's final plan recommended program, one which would result if future planning decisions call for diversion of West Point plant service area flows to the Renton plant. In addition to evaluating the impacts of Alternatives A-3/A-5, the EIS also describes the environmental impacts of the remaining final alternatives considered in Metro's draft plan (Alternatives A-1 and B-1) and the no-project alternative.

Other Aspects of the Final Wastewater Management Plan

Near-Term Collection System Projects. Two groups of near-term collection system projects are identified in the Metro plan: projects to be initiated and projects in progress. These projects are not assessed here since they do not involve decisions which currently must be made by EPA. Metro will evaluate environmental impacts of these projects with the State Environmental Policy Act.

Nonsewer Area. The Wastewater Management Plan recommends management options for on-site systems in the nonsewer area (the area for which sewers are not being planned over the next 20 years). These recommendations include: establishing a comprehensive program for design, construction, and maintenance of on-site and community systems; providing adequate staffing, funding, and enforcement of on-site wastewater management programs; encouraging experimentation with alternative technologies; and establishing a public education program. These recommendations are incorporated within the mitigation measures identified in this EIS for reducing adverse secondary groundwater and surface water impacts caused by continued growth in the nonsewer area.

Triggering Mechanism. The Wastewater Management Plan proposes a monitoring program, termed the triggering mechanism, to provide advance notice for expansion or additions to the Metro sewerage system, to monitor performance of on-site systems in nonsewer areas, and to monitor Puget Sound water quality near the proposed outfall. This mechanism is not separately analyzed in the EIS because it is itself a mitigation measure, and its impacts will be beneficial.

Sludge Disposal. The Metro plan assumes that long-term disposal for Renton sludge will be accomplished by application to forestlands, reclamation of marginal soils, and composting. This proposal and other long-term sludge disposal alternatives are currently being examined by Metro in a separate planning effort, which will be accompanied by a separate environmental review process.

Alternatives Available to EPA

EPA may develop other structural (facilities) alternatives or administrative alternatives as part of its EISs on wastewater facilities plans. In the case of the Metro Wastewater Management Plan, EPA has determined that Metro has examined a full range of structural alternatives, and that new structural alternatives are not warranted as part of this EIS. EPA administrative alternatives are of two types: funding and grant conditions. EPA may decide to fund or not fund the selected program, to fund one or both of the project phases, and to fund or not fund capacity of facilities beyond the

20-year capacity. EPA may also place conditions on subsequent design and construction grants to mitigate adverse construction, operational, or secondary impacts. Grant conditions being considered by EPA are discussed in the FOREWORD to the EIS.

Assessment of Impacts

Impacts of Final Plan Recommended Program and Mitigation Measures

Table S-1 summarizes the cost, construction and site-related, operational, and secondary impacts of the recommended program, and describes possible mitigation measures. As shown, the present worth costs of the recommended program are $225 million. This does not include costs for transporting and treating flows from the north part of the study area; these costs would include either costs for the Redmond and North Creek/Hollywood connections, or costs for certain modifications to the West Point collection system.

By 1990, the recommended program would increase Metro's monthly rates by about $6.00 per month, assuming Metro receives 33 percent of statewide grant funds. The total Metro 1990 monthly rate could vary between $15.00 and $35.00, depending on which improvements are made at Metro's Puget Sound plants.

The recommended program would generate a number of construction and site-related impacts. As shown in Table S-1, most of these are attributable to the tunnel/outfall to Seahurst Park. Adverse impacts include impacts caused by potential geologic and seismic hazards, spoils transport and disposal impacts, disruption of recreational uses of Seahurst Park, and traffic disruption. Most of these adverse impacts are short-term in nature, and mitigation measures are available to reduce their severity.

The main operational impacts of concern are water quality impacts. Over the short-term, during the 5 years it takes to design and build the recommended plan, deterioration in Green/Duwamish River water quality can be expected as sewage flows continue to increase beyond the Renton treatment plant's treatment capacity. Temperature, dissolved oxygen, and ammonia water quality standards would be violated, and DOE effluent dilution guidelines (20:1) would continue to be exceeded. Deteriorating water quality would increase the risks of impaired salmonid migration or fish kills. Mitigation measures proposed by Metro to reduce these short-term impacts on the Green/Duwamish River are listed in Table S-1, and additional available mitigation measures are listed as well.

Table S-1. Summary of Major Impacts and Mitigation Measures for Final Plan Recommended Program

Impact	Mitigation Measures
I. COSTS	
Present Worth Costs: $225,400,000	Unneeded.
Estimated 1990 Metro Monthly Rate: Assuming Metro receives 33 percent of statewide grant funds, $15.00 with "full utilization" of West Point plant, $35.00 with full secondary treatment at Puget Sound plants. About $6.00 month attributable to Renton recommended program.	Unneeded.
II. CONSTRUCTION AND SITE-RELATED IMPACTS	
Construction and Site-Related Impacts	
• Geologic and Seismic Hazards: Soil stability and seismic hazards could be encountered along tunnel/outfall route.	1. Metro-proposed detailed engineering and geotechnical studies should include: a. Identification of areas of soil instability along route and siting of facilities or development of construction methods to reduce soil instability hazards. b. Assessment of seismic hazards based on borings and site-specific seismic investigations, and development of project design to reduce seismic risks to acceptable levels. c. Re-assessment of Seahurst Park route based on engineering and geologic studies from the standpoints of cost, engineering and risk. 2. If Seahurst Park route not feasible, and another route selected, supplements to Final Wastewater Management Plan and EIS should be prepared.
• Spoils Transport and Disposal Impacts: Traffic and potential water quality impacts.	1. Preparation of a final spoils disposal plan. 2. Compliance with DOE limits for sediment discharge if wet transport is used.
• Cultural Resources: Archeological remains could be encountered along tunnel/outfall route.	1. Conduct detailed archeological survey of tunnel/outfall route prior to construction.
• Recreation: Disruption of recreational uses of Seahurst Park.	1. Scheduling construction activities during off-peak recreation periods to the extent practicable. 2. Preparation of plan to establish detailed procedures to reduce impacts and restore damaged areas.
• Traffic: Increased truck traffic at Renton plant and tunnel portals during construction.	1. Rerouting traffic around construction sites and providing flagmen to ensure traffic safety.
• Water Quality: Potential rerouting of Seahurst Park Creek during construction.	1. Siting of outfall to avoid necessity for rerouting of creek. If creek must be rerouted, rerouting should occur during summer months, when impacts on aquatic life would be least.
• Aesthetics. Pump station at Seahurst Park would be incompatible with natural park setting.	1. Selection of building design and materials to minimize visual impacts.

Table S-1. (cont'd.)

Impact	Mitigation Measures
Construction Employment: 3,384 job-years.	Unneeded.
III. OPERATIONAL IMPACTS	
Water Quality and Aquatic Biology	
● Short-Term Impacts on Green/Duwamish River: Temperature, dissolved oxygen, and ammonia water quality standards would continue to be exceeded. DOE effluent dilution guidelines (20:1) would continue to be exceeded. Increased risks of impaired salmonid migration or fish kills would result.	Measures to be Implemented: 1. Fast-track implementation of plant expansion. 2. Diversion of flow via sludge force mains. 3. Reduced summer flushing. 4. Industrial source control Additional Measures Available 1. Interim nitrification with existing facilities. 2. Construct special nitrification facilities. a. Ammonia stripping. b. Roughing filters. c. Breakpoint chlorination. 3. Use of Kent/Auburn lagoons. 4. Diversion of flow via Riverton/Renton pump station. 5. Diversion of effluent for land disposal. 6. Local agency infiltration control. 7. Water conservation. 8. Interim river flow augmentation. 9. Fisheries resource protection. 10. Sewer moratorium. 11. Eliminate septage disposal.
● Long-Term Impacts on Green/Duwamish River: Future water quality problems in river avoided through diversion of effluent. Salt wedge of estuary could move further upstream if DOE minimum flows not met. Dissolved oxygen in salt wedge may decrease, but dissolved oxygen at surface would increase. Future risks to aquatic life would be avoided by diversion of effluent.	Unneeded.
● Impact on Puget Sound from West Point Discharge: Improved effluent quality due to Renton sludge removal, creating less risk for aquatic life.	Unneeded.
● Impact on Puget Sound from Renton Discharge: No significant impacts likely. Localized increases in turbidity, ammonia, and heavy metals near outfall. Possible heavy metal accumulation in mussels and clams near outfall. Cumulative water quality and biological impacts not easily predictable due to insufficient information.	1. For heavy metals, complete Metro toxicant study and implement recommendations. 2. Metro-proposed detailed oceanographic and biological studies of outfall. Studies should include winter shoreward current velocities near Seahurst Park and baseline monitoring of shellfish. 3. Monitoring of Puget Sound by Metro and DOE. 4. Improve chlorination system of Renton plant (improvements currently underway).
Resource Uses: Project would consume 53 million Kwh per year, 550 tons per year chlorine and 575 tons per year ferric chloride.	Unneeded.

Table S-1. (cont'd.)

Impact	Mitigation Measures
Growth-Related Impacts of Project Phasing: Requires Renton tunnel/outfall, which is nonmodular (cannot easily be expanded in modules). Sized for 50-year population projections not based on PSCOG projections or local land use policies.	1. Reduce staging period. 2. Base 50-year flow projections on land use plans or PSCOG population projections.
Recreation: Potential for additional recreation opportunities incorporating planning facilities.	Unneeded.
IV. SECONDARY IMPACTS OF GROWTH PROJECTED FOR STUDY AREA	
Air Quality: Population projections used for wastewater management planning consistent with those used for Puget Sound Air Quality Management Plan (AQMP). Therefore, increased emissions from study area growth have been accounted for in AQMP.	1. AQMP air quality control measures.
Surface Water and Aquatic Biology: Water quality deterioration and anadromous fish losses are occurring now because of urbanization, and could continue in the future. High-growth subdrainage basins will be particularly affected.	1. Metro 208 areawide water quality planning. 2. Local nonpoint source control programs.
Groundwater: Risks to groundwater (and surface water) from inadequately sited, operated, or maintained on-site systems in nonsewer area.	1. Establish comprehensive on-site system management program. 2. Provide adequate staffing, funding, and enforcement. 3. Encourge experimentation with alternative technologies. 4. Establish public education program. 5. Determine groundwater carrying capacity. 6. Establish institutional agreements for on-site system management.
Land Use: Proposed service area is consistent with local land use policies.	Unneeded.
Prime Farmland Conversion: Between 3,950 and 5,213 acres of prime farmland could be converted to urban uses over the next 20 years in the Sammamish Valley, Lower Green River Valley, and Upper Green River Valley agricultural districts. This represents 21-27 percent of the remaining prime farmland in these three districts.	1. King County Purchase of Development Rights (PDR) program. 2. King County Sewerage General Plan (SGP) policies. 3. Metro Resolution 3380 policies. 4. King County modification of SGP and Metro modification of Resolution 3380 to include additional King County prime farmlands. 5. City development of prime farmland protection policies for incorporated areas. 6. Conduct detailed prime farmland assessments for future interceptor sewers. 7. King County ordinance and General Development Guide policies.
Sensitive Areas: Study area growth could occur on soil-related sensitive areas, wetlands, and floodplains. High-growth subdrainage basins which contain relatively large acreages of these sensitive areas would be particularly affected.	1. Local floodplain management programs and federal Flood Insurance Program. 2. Conduct detailed sensitive area assessments for future interceptor sewers.

Table S-1. (cont'd.)

Impact	Mitigation Measures
Public Service Systems: Study area growth will increase demands on public services such as wastewater management, water supply, drainage, solid waste management, recreation, social services, transportation, and electricity and gas.	1. Implementation of existing comprehensive and special purpose plans and policies of local agencies.
Public Finance: Study area growth will increase both public costs and revenues, and could create fiscal problems for some local governments.	1. Implementation of existing local measures for financing the costs of growth.

Over the long-term, water quality of the Green/Duwamish River would be protected by diversion of Renton effluent to Puget Sound. No major water quality or biological impacts of discharge of Renton effluent to the sound off Seahurst Park are expected. Minor impacts include potential localized increases of certain pollutants in the immediate vicinity of the outfall, and potential heavy metals accumulation in shellfish in the immediate vicinity of the outfall.

Although no major water quality or biological impacts are predicted with the Seahurst Park discharge, little information is available regarding cumulative impacts of all waste discharges to Puget Sound, considering the proposed Renton discharge together with other waste sources. However, it should be recognized that much of the Renton treatment plant currently reaches Puget Sound indirectly via the Green/Duwamish River; the Seahurst Park discharge should therefore not be considered a "new" point source in terms of overall Puget Sound water quality.

The secondary impacts of growth projected for the study area are an indirect consequence of implementing the recommended program. Neither EPA nor Metro is institutionally "responsible" for growth and secondary impacts. Because the planned wastewater facilities will assist in accommodating projected growth, the philosophy that EISs are full disclosure documents dictates that secondary impacts be examined in this EIS and mitigated where possible. As shown in Table S-1, projected growth in the study area will have a number of impacts on air and water quality, land use, and public services and finance; mitigation measures for these impacts are also shown in Table S-1.

Of particular concern to EPA are: (1) water quality deterioration and anadromous fish losses caused by urbanization-induced nonpoint source pollution; (2) risks to groundwater from inadequately sized, operated or maintained on-site systems; (3) conversion of prime farmlands (between 3,950 and 5,213 acres of prime farmland could be converted over the next 20 years in the Sammamish Valley, Lower Green River Valley, and Upper Green River Valley); and (4) development on wetlands and floodplains. EPA programs and policies require that these impacts be mitigated where possible. Mitigation measures listed in Table S-1 are not necessarily the responsibility of EPA or Metro, but are nevertheless presented for public review.

Comparison of Alternatives

Table S-2 compares the costs, construction and site-related impacts, operational impacts, and secondary (growth-related) impacts of the recommended program, Alternatives A-3/A-5, Alternative A-1, Alternative B-1, and the no-project

Table S-2. Summary Comparison of Major Environmental Impacts: Wastewater Management Alternatives for the Lake Washington/Green River Basins

Type of Impact	Impacts of Final Plan Recommended Program	Impact of Alternatives A-3/A-5	Impact of Alternative A-1	Impact of Alternative B-1	Impacts of No Project
I. COSTS					
Present worth costs	$225,400,000 (does not include facilities for north study area)	$279,000,000 (A-3) $345,000,000 (A-5)	$267,000,000	$329,000,000	-
Estimated 1990 Metro monthly rate, assuming Metro receives 33% of statewide grant funds.	$15.00 with "full utilization" of West Point. $35.00 with full secondary treatment at Puget Sound plants. About $6.00/month attributable to Renton recommended program.	Higher rates than recommended program. Exact estimates unavailable.	Higher rates than recommended program. Exact rates unavailable.	Higher rates than recommended program. Exact estimates unavailable.	-
II. CONSTRUCTION AND SITE-RELATED IMPACTS					
Construction and site-related impacts.	Construction and site impacts from Renton treatment plant improvements (expansion to 72 MGD) and tunnel/outfall. Impacts of tunnel/outfall include geologic/seismic hazards, spoils transport/disposal impacts, cultural resources impacts, recreation use disruption, increased traffic, possible rerouting of Seahurst Park Creek, and visual impacts of Seahurst Park pump station.	Construction and site impacts from Renton treatment plant improvements (expansion to 99 MGD), tunnel/outfall (same impacts as recommended program), and Redmond and North Creek/Hollywood connections.	Construction and site impacts from Renton treatment plant improvements (expansion to 99 MGD plus nitrification) and Redmond and North Creek/Hollywood connections. Requires purchase of 19 additional acres at Renton plant.	Construction and site impacts from Renton treatment plant improvements (expansion to 72 MGD plus nitrification) and Kenmore treatment plant and tunnel/outfall. Requires purchase of 19 additional acres at Renton plant.	-
Construction employment	3,384 job-years	6,290 job-years (A-3) 8,770 job-years (A-5)	4,050 job-years	5,450 job-years	-
III. OPERATIONAL IMPACTS					
Water quality and aquatic biology-Green/Duwamish River	Short-term: Temperature, dissolved oxygen, and ammonia water quality standards would continue to be violated. DOE effluent dilution guidelines (20:1) would continue to be exceeded. Increased risks of impaired salmonid migration or fish kills would result.	Short-term: Same as recommended program.	Short-term: Same as recommended program.	Short-term: Same as recommended program.	Short-term: Same as recommended program.

Table S-2. (cont'd.)

Type of Impact	Impacts of Final Plan Recommended Program	Impact of Alternatives A-3/A-5	Impact of Alternative A-1	Impact of Alternative B-1	Impacts of No Project
-Green/Duwamish River	Long-term: Future water quality problems in river avoided through removal of effluent. Salt wedge of estuary could move further upstream if DOE minimum flows not met. Dissolved oxygen in salt wedge may decrease slightly, but dissolved oxygen at surface would increase. Future risks to aquatic life avoided by diversion of effluent.	Long-term: Same as recommended program.	Long-term: Ammonia and dissolved oxygen problems mitigated through nitrification. Temperature standards, DOE effluent dilution guidelines, and DOE estimated limitations for copper, mercury, and zinc would continue to be exceeded. Increased temperatures could adversely affect salmonid migration.	Long-term: Same as A-1, except that lower flows would cause problems to be less severe and cause less risk to salmonid migration.	Long-term: Major adverse ammonia and dissolved oxygen problems, in addition to problems noted for A-1. Severe risks of impaired salmonid migration or fish kills created. Continued existence of fishery would be threatened.
-Puget Sound	West Point discharge: Improved effluent quality due to Renton sludge removal, creating less risk for aquatic life.	West Point discharge: Improved effluent quality due to sludge removal and flow diversion, creating less risk to aquatic life.	West Point discharge: Same as Alternatives A-3/A-5.	West Point discharge: Same as Alternatives A-3/A-5.	West Point discharge: No change -- continued violation of NPDES permit suspended solids limit due to Renton sludge.
	Renton discharge: No major impacts. Localized increases in turbidity, ammonia, and heavy metals near outfall. Possible heavy metals accumulation in mussels and clams near outfall. Cumulative water quality and biological impacts not easily predictable due to insufficient information.	Renton discharge: No major impacts. Localized increases in turbidity, ammonia, and heavy metals near outfall. Effluent surfacing would occur less often at Three Tree Point (A-3) compared to Alki Point (A-5). Effluent dispersion by tidal currents more rapid, and effluent residence time in Puget Sound is shorter, at Alki Point. Cumulative water quality and biological impacts not easily predictable due to insufficient information	Renton discharge: Renton discharge to Green/Duwamish River enters Puget Sound. No major impacts expected. Cumulative water quality and biological impacts not easily predictable due to insufficient information.	Renton discharge: Same as A-1. Kenmore discharge: No major impacts. Localized increases in turbidity, ammonia, and heavy metals near outfall. Possible heavy metal accumulation in mussels and clams near outfall. Cumulative water quality and biological impacts not easily predictable due to insufficient information.	Renton discharge: Potential adverse water quality and biological impacts on Puget Sound. Cumulative water quality and biological impacts not easily predictable due to insufficient information.
Resource Use -Energy Use	53,000,000 Kwh/yr	87,000,000 Kwh/yr (A-3) 89,000,000 Kwh/yr (A-5)	98,000,000 Kwh/yr	75,000,000 Kwh/yr	Minor increases over present energy use.

Table S-2. (cont'd.)

Type of Impact	Impacts of Final Plan Recommended Program	Impact of Alternatives A-3/A-5	Impact of Alternative A-1	Impact of Alternative B-1	Impacts of No Project
-Chemical use	553 tons/yr chlorine 575 tons/yr ferric chloride	760 tons/yr chlorine 791 tons/yr ferric chloride	760 tons/yr chlorine 240 tons/yr sulfur dioxide 872 tons/yr ferric chloride	550 tons/yr chlorine 170 tons/yr sulfur dioxide 771 tons/yr ferric chloride	Minor increases over present chemical use.
Growth-related impacts of project staging	Requires Renton tunnel/outfall, which is non-modular (cannot easily be expanded in modules). Sized for 50-year population projections not based on PSCOG projections or local land use policies.	Requires North Creek/Hollywood connection, Redmond connection, and Renton tunnel/outfall, which are nonmodular. Latter two sized for 50-year projections.	Same as Alternatives A-3/A-5, except Renton tunnel/outfall not required.	More flexible than other alternatives. Only nonmodular facility is Kenmore plant tunnel/outfall.	Not responsive to future study area growth.
Recreation	Potential for additional recreation opportunities associated with planned facilities.	Potential for additional recreation opportunities associated with planned facilities.	Potential for additional recreation opportunities associated with planned facilities.	Potential for additional recreation opportunities associated with planned facilities.	No effect
IV. SECONDARY IMPACTS OF GROWTH PROJECTED FOR STUDY AREA	See Table S-1. Impacts are same as shown in Table S-1 except for no action. For no action, lack of wastewater treatment capacity could encourage more growth outside study area and encourage lower density development within study area. Otherwise, secondary impacts similar to those described for other alternatives.				

alternative. The present worth costs of the recommended program ($225 million) are lower than the other alternatives, but these costs are not directly comparable because the recommended program would require a number of improvements to the West Point collection system not included in the $225 million estimate. The costs of the remaining alternatives are, however, directly comparable to each other; Alternative A-1 has the least present worth costs, followed by Alternatives A-3, B-1, and A-5.

Key trade-offs among the alternatives, in addition to cost, are described below.

Alternatives A-3/A-5. Alternative A-3 is one possible consequence of implementing the final plan recommended program. It would result if the West Point deemphasis policy is continued and require construction of the Redmond and North Creek/Hollywood connections to serve the north part of the study area. As with the recommended program, construction of the Renton tunnel/outfall would have adverse short-term impacts, and additional adverse impacts would result from construction of the Redmond and North Creek/Hollywood connections. Future water quality problems and risks to salmonid migration in the Green/Duwamish River would be avoided. Discharge of Renton effluent to Puget Sound is not expected to create major water quality impacts at either Three Tree Point (Alternative A-3) or Alki Point (Alternative A-5). At Three Tree Point, effluent surfacing is predicted to occur less often than at Alki Point. However, at Alki Point, effluent dispersion would be more rapid and effluent residence time in Puget Sound would be shorter.

Alternative A-1. Under this alternative, construction impacts of the Renton tunnel/outfall would be avoided, but construction impacts of the Redmond and North Creek/Hollywood connections would still occur. Current ammonia and dissolved oxygen problems in the Green/Duwamish River would be mitigated by nitrification, but temperature standards, DOE effluent dilution guidelines, and DOE estimated limitations for certain heavy metals would all be exceeded. Salmonid migration could be affected, particularly by increased temperatures in the river. This alternative would require more energy and chemicals than either Alternatives A-3/A-5 or Alternative B-1.

Alternative B-1. Under this alternative, construction of the Redmond connection, North Creek/Hollywood connection, and Renton tunnel/outfall would not be necessary; construction of the Kenmore treatment plant tunnel/outfall could have adverse short-term construction impact. Water quality and fisheries impacts in the Green/Duwamish River from discharge of nitrified effluent would be similar, but less severe, than those of Alternative A-1, because 20-year flows would be 72 MGD vs. 99 MGD for the preferred program. No major water quality impacts are expected from discharge of secondary effluent from the Kenmore plant to Puget Sound. This alternative is more flexible than either Alternatives A-3/A-5 or Alternative A-1 because it requires construction of only one nonmodular facility, the Kenmore tunnel/outfall.

No-Project Alternative. Under the no-project alternative, no capital improvements would be made to the Renton sewerage system, and the costs of the other long-term alternatives would be avoided. Major ammonia and dissolved oxygen problems would occur in the Green/Duwamish River with continued long-term discharge of secondary effluent; also, the additional water quality problems mentioned under Alternative A-1 would be intensified. The ammonia and dissolved oxygen problems would cause severe risks of impaired salmonid migration and fish kills; the continued existence of the Green/Duwamish River fishery, which has an estimated value of over $10 million dollars, would be threatened. The no-project alternative would not be responsive to study area growth; lack of sewerage capacity could encourage more growth outside the study area and more low density development using on-site systems within the area.

Impacts Common to All Alternatives. All alternatives would result in short-term deterioration of the Green/Duwamish River water quality, as described under the recommended program. Also, all alternatives except the no-project alternative would indirectly create the secondary impacts described under the recommended program.

Public Involvement

Public participation for this EIS has been coordinated and, where possible, integrated with the full-scale public participation program undertaken by Metro in preparing its Wastewater Management Plan. Key EIS public participation activities have included publication and distribution of an EIS information brochure, conducting scoping meetings, an EIS presentation to the Renton 201 Citizens Advisory Committee, attendance and participation in Metro public meetings on wastewater management alternatives and the preliminary wastewater management plan, and conducting of five public meetings and two public hearings on the Draft EIS and Wastewater Management Plan.

The Draft EIS was forwarded to numerous federal, state and local agencies, special interest groups, private citizens, and public libraries to act as both an informational document and as an avenue to comment on the proposed wastewater project. Also, a separate public summary of the EIS was mailed to over 1,200 individuals. Numerous written comments on the Draft EIS were received; these are presented in Chapter 12 of the Final EIS.

A full public review process has been scheduled for the Final EIS and final Metro plan. Over 200 copies of the Final EIS and about 3,000 copies of a summary of the EIS are being distributed for citizen and agency review and comment.

Metro has scheduled a series of public informational meetings on the final plan at the following dates and locations:

Thursday, August 20 - Bothell City Council Chambers
Monday August 24 - Ober Activity Center, Vashon Island
Tuesday, August 25 - Metro Fourth Floor Conference Room, Seattle
Wednesday, August 26 - Highline High School Cafetorium
Thursday, August 27 - Puget Sound Power and Light Auditorium, Renton
Wednesday, September 2 - Alki Congregational Church

EPA and Metro will hold joint public hearings on the Final EIS and final plan at the following dates and locations:

Tuesday, September 8 - Puget Sound Power and Light Auditorium, Bellevue
Wednesday, September 9 - Alki Congregational Church
Thursday, September 10 - Highline High Scool Cafetorium

Individuals or groups that wish to comment in writing on the Final EIS may forward written comments to:

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
Attention: Roger Mochnick M/S 443

Comments should be sent by the close of the 30-day comment period on September 14. All verbal and written comments will be considered by EPA in reaching its final decision following the close of the comment period.

Chapter 1

INTRODUCTION

The Municipality of Metropolitan Seattle (Metro) has prepared a Final Wastewater Management Plan for the Lake Washington/Green River Basins. The boundaries of the study area for this plan are shown in Figure 1-1.

This Final Environmental Impact Statement (EIS) has been prepared by the U. S. Environmental Protection Agency (EPA). The applicable EPA decisions are to approve the Wastewater Management Plan and to partially fund projects called for in the plan.

Metro's Wastewater Management Plan

Metro has prepared the Final Wastewater Management Plan for the Lake Washington/Green River Basins for three major reasons (Metro, 1981):

1. The Renton treatment plant and several other sewerage facilities have reached their operating capacity and need expansion to accommodate future growth. Metro has selected a 20-year planning horizon to examine future treatment capacity needs, consistent with federal funding requirements.
2. Increasing quantities of secondary effluent from the Renton plant are being discharged to the Duwamish River, and near-term water quality problems can be forecast during low flow periods; constituents of concern include ammonia, chlorine, dissolved oxygen, and temperature.
3. Much new development within the study area will be using on-site or community wastewater management technologies, and these systems have the potential to adversely affect water quality.

Development of the Wastewater Management Plan

Wastewater management planning for the study area has been influenced by several previous wastewater planning efforts. The most important of these are Metro's Comprehensive Plan (Metro, 1959); the RIBCO water quality management study (STR Inc., 1974b); Metro's Areawide Water Quality Plan (208 Plan)

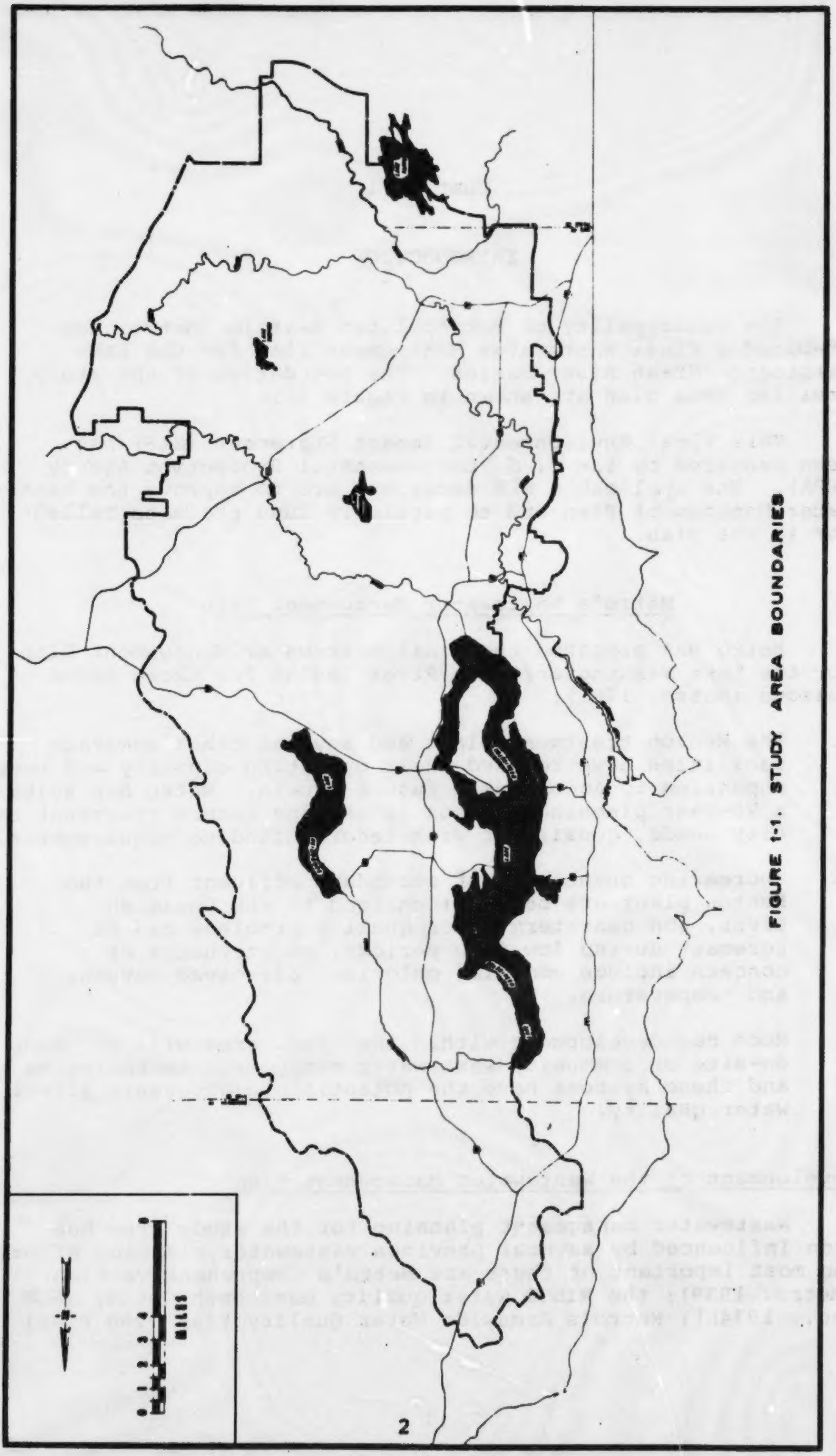


FIGURE 1-1. STUDY AREA BOUNDARIES

(Metro, 1978b); and Metro's wastewater facilities planning for its Puget Sound plants. The latter planning effort has influenced current planning for the Lake Washington/Green River Basins through recommending de-emphasis of the West Point treatment plant, thereby increasing the Renton treatment plant service area, and installing sludge handling facilities at the Renton plant. The West Point de-emphasis policy will be reconsidered when a decision is made regarding Metro's application for a waiver of secondary treatment requirements at West Point.

The detailed process for preparing the Wastewater Management Plan for the Lake Washington/Green River Basins is described in Metro's plan, and will only be summarized here. Between August 1979 and April 1980, Metro issued six technical memoranda serving as background data for the draft plan. These technical memoranda and their associated appendices are often used as sources of information for this EIS. The memoranda cover the following topics:

Memo #1: A description of existing wastewater facilities in the study area (Metro, 1979d)
Memo #2: A description of the environmental characteristics of the study area (Metro, 1979e).
Memo #3: An analysis of agency plans and policies affecting the wastewater plan (Metro, 1980a).
Memo #4: A description of alternative wastewater techniques (Metro, 1980b).
Memo #5: A discussion of facilities planning issues, objectives and screening criteria (Metro, 1980c).
Memo #6: An analysis of future wastewater flows and loadings (Metro, 1980d).

In early April, Metro issued its preliminary plan, which identified near-term and long-term wastewater management alternatives for the study area. Public meetings were held on the preliminary plan in May 1980. Metro's Draft Wastewater Management Plan was released in December 1980.

Public meetings and hearings were held on the draft plan in January 1981. Following this public input, Metro released the Final Wastewater Management Plan in July 1981.

EIS Context

Major Issues Addressed by EIS

Preparation of a comprehensive wastewater management plan for the 620-square-mile study area raises a number of important and interesting issues. Based on public input and consultation with affected agencies, the following three issue groups have been determined to be of greatest importance to this EIS, and consequently are emphasized.

Costs:	What are the comparative costs and financial effects on users of the various near-term and long-term alternatives considered by Metro?
Water Quality:	What are the water quality and biological trade-offs of continued discharge of Renton treatment plant effluent to the Green-Duwamish River compared to discharge to Puget Sound? What are the water quality impacts, if any, of on-site systems in the less developed portions of the study area?
Land Use:	What are the land use impacts of wastewater management alternatives for the study area, and what impacts will growth accommodated by facilities expansion have on water quality, agricultural lands, sensitive areas, air quality, and public services and finance?

These three general issue groups have been recognized in Metro's preliminary plan by Metro as central to facilities planning decisions. The EIS, while emphasizing the above three issue groups, also covers the entire range of biophysical and socio-economic impacts related to Metro's near-term and long-term alternatives.

National Environmental Policy Act of 1969 (NEPA) Requirements

Under NEPA, all federal agencies must build into their decision-making processes mechanisms for consideration of the environmental effects of proposed actions and mechanisms for minimizing adverse effects of these actions. The EIS required by Section 102(2)(c) is the action-forcing mechanism of NEPA. EISs must include a detailed statement on the following:

1. The environmental impact of the proposed action.
2. Any adverse impacts which cannot be avoided should the project be implemented.
3. Alternatives to the proposed action.
4. The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity.
5. Any irreversible and irretrievable commitments of resources.

In 1978, the Council on Environmental Quality (CEQ) issued regulations implementing NEPA. Significant requirements of these regulations include maximum opportunities for public participation (including EIS scoping meetings);

page limitations for EISs; and an easy to understand writing style. Each federal agency is responsible for preparing its own procedures for implementing NEPA, which are to be consistent with the CEQ requirements. EPA issued its final regulations on November 6, 1979 (Federal Register, Vol. 44, No. 216, pg. 64174).

EIS Chronology

The EIS for Metro's Wastewater Management Plan was initiated in August 1979. On September 26, 1979 and October 17, 1979, EIS "scoping" meetings were held in conjunction with Metro public information meetings, to obtain public input on important issues for the EIS. On October 2, 1979, EPA published in the Federal Register its Notice of Intent to prepare an EIS on Metro's Wastewater Management Plan.

In January 1980, the EIS consultant prepared a discussion paper on environmental screening criteria for use by Metro in screening preliminary wastewater management alternatives. Based on Metro's preliminary planning, a preliminary Draft EIS was prepared and the findings reviewed with key agencies prior to publication of the Draft EIS in December 1980. Public meetings and hearings were held on the Draft EIS in January 1981. Following this public input, the Final EIS was prepared.

Subsequent EIS Activities

Public meetings and hearings on the Final EIS and Final Wastewater Management Plan are currently scheduled for August and September 1981. A Metro decision on the final plan is scheduled for October 1981. Subsequently, EPA and the Washington Department of Ecology will take final action to approve or partially/conditionally approve the final plan; these actions are scheduled for November 1981, following which a Record of Decision will be published. A Step 2 design grant would then be made according to state funding priorities.

Public Participation

The public participation program for this EIS has been coordinated and, where possible, integrated with Metro's extensive public participation program for its Wastewater Management Plan.

An initial informational brochure describing the EIS process and key issues was prepared by EPA in September 1979 and widely distributed. EIS scoping meetings held in September and October 1979 were a major opportunity for public input in determining issues to be emphasized in the EIS. Periodic presentations were subsequently made to the Citizens Advisory Commitee for Metro's Wastewater Management Plan to advise the committee of EIS status and receive comments. A public summary of this Draft EIS was prepared and distributed to an extensive mailing list. Public meetings and hearings on the Draft EIS were held in January 1981.

The Draft EIS comment period, the public meetings and hearings held on the Draft EIS, and the public comments and responses included in the Final EIS fulfill EPA's formal public participation responsibilities under the National Environmental Policy Act.

Institutional Considerations

This section summarizes laws, policies, and regulations affecting the EIS and identifies the roles of key agencies affected by the Wastewater Management Plan and EIS. A more detailed institutional overview of the study area is presented in Appendix A to the EIS.

Laws, Policies, and Agencies Affecting the EIS

Clean Water Act. The U. S. Environmental Protection Agency (EPA) is charged with administering the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act. Section 201 of the Clean Water Act establishes a construction grants program for municipal wastewater facilities, wherein federal grants are offered for the planning (Step 1), design (Step 2), and construction (Step 3) of publicly-owned treatment works. Section 208 of the act establishes an areawide waste treatment management planning process. Section 208 plans must develop controls for both point and nonpoint sources of water pollution. Under Section 303 of the act, states are required to prepare and enforce ambient water quality standards and to prepare basin plans showing how these standards will be met. Lastly, under Sections 401 and 402 of the act, EPA or the states are required to issue National Pollutant Discharge Elimination System (NPDES) permits for all point sources of pollution.

Within the Lake Washington/Green River Basins, the State Department of Ecology (DOE) administers the construction grants program and the NPDES program, and sets water quality standards. In 1975, DOE prepared the 303(e) basin plan for the Cedar and Green River basins. Metro's water quality planning responsibilities in the study area include both areawide (208) and wastewater facilities (201) planning.

Section 404 of the Clean Water Act sets forth a regulatory program for dredge and fill activities. Under this section, the Corps of Engineers issues permits for the discharge of dredged or fill materials into waters of the United States and on adjacent wetlands.

Clean Air Act. Under the Clean Air Act, states are required to prepare State Implementation Plans (SIPs) demonstrating means for achieving and maintaining national ambient air quality standards. The EPA procedures for implementing NEPA require formal consultation with state and regional air quality planning agencies to determine conformity of a proposed action with the SIP. The Draft EIS must include a statement indicating whether the project conforms with the SIP. If the project does not conform to the SIP, EPA will not give the project final approval. EPA has determined that the proposed project does conform to local portions of the SIP because both involve the same population projections (see Chapter 7).

Endangered Species Act. Under this act, federal agencies are prohibited from jeopardizing threatened or endangered species or modifying habitats essential to their survival. EPA procedures for implementing NEPA require formal consultation with the Fish and Wildlife Service or National Marine Fisheries Service, as appropriate, and subsequent development of mitigation measures if endangered species may be affected by a project. EPA has determined that the proposed project will have no effect on any listed threatened or endangered species (see Chapter 3).

Fish and Wildlife Coordination Act. Under this act, federal agencies involved in projects resulting in modifications of streams or other water bodies are required to protect fish and wildlife resources which may be affected by the project. EPA procedures for implementing NEPA require consultation with the Fish and Wildlife Service and appropriate state wildlife agencies to develop mitigation measures for adverse impacts. Such consultation has occurred during preparation of this EIS. The status of fish and wildlife resources in the study area is discussed in Chapter 3 of the EIS.

EPA has received comments from these agencies on the Draft EIS (see Chapter 12). EPA will include a grant condition requiring Metro to mitigate potential impacts to geoduck beds near the outfall site (see Chapter 8). Fish and wildlife agencies will have another opportunity to suggest mitigation measures during their review of Corps of Engineers permits, which Metro will be required to obtain prior to any construction in navigable waterways (see Chapter 5).

National Historic Preservation Act. Under this law, if federal agencies undertake activities affecting sites of historic, architectural, archeological, or cultural value that are listed on the National Register of Historic Places, then the Advisory Council on Historic Preservation (ACHP) must be consulted and mitigation measures must be developed.

EPA has consulted with the latest edition of the National Register of Historic Places, which shows a number of listed sites in the study area. However, no listed or eligible sites are near the Renton treatment plant or the proposed tunnel/outfall route. Therefore, EPA has determined that no listed or eligible site will be affected by the proposed action (see letter from Advisory Council on Historic Preservation, and response, Chapter 12).

Archeological and Historic Preservation Act. This law requires federal agencies to undertake data recovery and preservation activities if federal activities may cause irreparable destruction of significant scientific, prehistoric, historic, or archeological data. In consultation with the State Historic Preservation Officer (SHPO), and based on a cultural resources survey at the Renton treatment plant site, EPA has concluded that the expansion of facilities at that site will not affect cultural resources. Cultural resources along the proposed tunnel corridors have not been inventoried. Prior to construction, Metro shall ensure that a cultural resource survey is conducted, in consultation with the SHPO, and that the requirements of the Archeological and Historic Preservation Act are met (see Chapters 5, 8, and comment letter from SHPO in Chapter 12).

Coastal Zone Management Act. This act establishes funding and requirements for state coastal zone management programs; in Washington, shoreline management programs have been prepared to meet requirements of both the state Shoreline Management Act and the federal act. Under the EPA procedures for implementing NEPA, if EPA activities have significant coastal zone impacts, then a determination of consistency with the applicable coastal zone management program is required. EPA, in consultation with the King County shoreline management staff, has determined that the proposed tunnel and outfall would be consistent with the state coastal zone management program for Seahurst Park. In consultation with the City of Seattle shoreline management staff, EPA has determined that there is some uncertainty regarding consistency of the proposed tunnel and outfall with the state coastal zone management program for Alki Point. Metro would be required to obtain a shoreline permit from either King County or Seattle, depending on the selected outfall location. For Alki Point, Metro would be required to demonstrate that no feasible outfall location exists in a less restrictive shoreline class (see Chapter 5).

EPA Policy on Agricultural Lands Protection. In September 1978, EPA issued its policy, pursuant to Executive Order 11988, to protect environmentally significant agricultural lands. Under this policy, EPA is required to identify the direct and indirect impacts of its actions on environmentally significant agricultural lands, and to avoid or mitigate, to the extent possible, identified adverse impacts. Potential adverse impacts and corresponding mitigation measures have been identified in the EIS (see Chapter 7), and a grant condition will be included to encourage implementation of mitigation measures (see Chapter 8).

EPA Policy on Floodplain and Wetlands Protection. In January 1979, EPA issued its statement of procedures on floodplain management and wetlands protection, pursuant to Executive Order 11990. Under these procedures, EPA is required to assess floodplains and wetlands impacts of its actions, and to either avoid adverse impacts or minimize them if no practicable alternative to the action exists. Potential adverse impacts and corresponding mitigation measures have been identified in the EIS (see Chapter 7), and a grant condition will be included to encourage implementation of mitigation measures (see Chapter 8).

Affected Agencies and Their Jurisdictions

Environmental management within the study area is carried out by a large number of federal, state and local agencies, many of which will be affected by Metro's Wastewater Management Plan. Table 1-1 is a matrix of agency responsibilities in the Lake Washington/Green River Basins. For each agency, responsibilities in each functional area are classified as either advisory, planning, regulatory, implementing (construction and operation), or funding. Not shown in this table are the numerous agencies engaged in research and monitoring activities. The responsibilities of key affected agencies are summarized below.

Environmental ProtectionAgency. The EPA has regulatory authority in the fields of water quality, wastewater management, water supply, solid waste management, and air quality. EPA water quality responsibilities are established in the Clean Water Act, the provisions of which have been previously reviewed. EPA responsibilities in water supply, solid waste, and air quality are established in the Safe Drinking Water Act, Resource Conservation and Recovery Act, and Clean Air Act, respectively.

Table 1-1. Institutional Overview:
Lake Washington/Green River Basins

Agency	Public Service Systems						Environmental Management			
	Wastewater Management	Water Supply	Drainage/ Flood Control	Solid Waste Management	Recreation	Transportation	Water Quality	Fish and Wildlife	Air Quality	Land Use
Federal										
EPA	R$	R	$	R$			R$		R$	
Army Corps of Engineers		PI$	PRI$				R			
Depart. of Housing & Urban Development			R							$
USDA, Forest Service					PRI$					
Heritage Conservation & Recreation Service					A$					
Depart. of Transportation						PI$				
Fish & Wildlife Service							A	A		
State										
Dept. of Ecology	R$	PR$	R	PR			R$		R$P	R$
Dept. of Fisheries		R	R				R	R$I		
Dept. of Game		R	R		RI$		R	R$I		
Dept. of Natural Resources			R		PRI$		R$			PR
Parks & Recreation Commission					PI$					
Dept. of Social & Health Services	R	R					R	R		
Dept. of Transportation						PI$				
Regional/Local										
PSCOG	A	A		P	A	P	A		P	P
Seattle-King County Dept. of Public Health	R	R		R			R			
Metro	PI$		P			PI$	PI$			
Counties	P	P	PRI$	PI$	PI$	PI$	PRI$			PRI$

Table 1-1 (cont.)

Agency	Public Service Systems						Environmental Management			
	Wastewater Management	Water Supply	Drainage/ Flood Control	Solid Waste Management	Recreation	Transportation	Water Quality	Fish and Wildlife	Air Quality	Land Use
King County Soil Conservation District			A				A			A
Cities	PI$	PI$	PRI$	PI$	PI$	PI$	PRI$			PRI$
Water and Sewer Districts	PI$	PI$					PI$			
Sno-met	PI$		PI$				PI$			
Puget Sound Air Pollution Control Agency									PR	

CODE
A = Advisory
P = Planning
R = Regulatory
I = Implementing
$ = Funding

Corps of Engineers. Under the federal Flood Control Act, the Corps of Engineers is responsible for flood control planning and implementation on major rivers and streams. Under Section 404 of the Federal Water Pollution Control Act, as amended, the Corps administers the national permit program for dredge and fill activities. Also, under Section 10 of the River and Harbor Act of 1899, the Corps issues permits for the performance of any work in the navigable waters of the United States.

Department of Ecology. The DOE is the equivalent of EPA at the state level, having regulatory responsibility in the fields of water quality, wastewater management, solid waste management, air quality, and flood control. In addition, DOE administers the state Shoreline Management Act.

Departments of Fisheries and Game. The Department of Fisheries is responsible for managing food fish and shellfish, whereas the Department of Game is responsible for managing various game species, including game fish. These agencies advise DOE on water rights and allocation, and must jointly issue a hydraulics permit for alteration of natural streams and their uses.

Department of Natural Resources. This department is a natural resource agency within the state, with responsibility for state lands management, forest practices, geological services, and limited drainage and flood control activities.

Puget Sound Council of Governments. PSCOG is a voluntary association of local governments within King, Kitsap, Pierce and Snohomish Counties. PSCOG is responsible for developing advisory regional plans and policies, and is also responsible for conducting reviews of projects using federal assistance under Office of Management and Budget Circular A-95.

Metro. Metro is a regional service agency with planning, implementation, and funding responsibilities in the fields of water quality and transit. Metro's past water quality planning activities have included management of the River Basin Coordinating Committee (RIBCO) studies, preparation of the 208 areawide water quality management plan, and preparation of a facilities plan for its four Puget Sound plants. Metro acts as a "wholesaler" for wastewater services.

Counties and Cities. The Lake Washington/Green River Basins contain portions of three counties (King, Snohomish, and Pierce) and 18 cities. As general purpose governments, these counties and cities undertake a spectrum of public services and environmental management activities.

Special Districts. Numerous special purpose districts exist within the study area, providing key services such as water, sewers, and schools.

Existing Sewerage Facilities

The Study Area

The study area encompasses 620 square miles north, east and south of Lake Washington (see Figure 1-1). About 25 percent of this land presently has access to sanitary sewer service; the balance of the area is rural and relies on septic tanks for sewage disposal. The study area includes 40 local sewering agencies (listed in Table 1-2 and mapped in Figure 1-2), 32 of which are sewered.

The Renton division of Metro operates the wastewater collection and treatment system which collects wastewater from most of the study area and transports it to the Renton sewage treatment plant for treatment and disposal. The West Point division of Metro currently operates this collection system in the north part of the study area, where the wastewater is transported to the West Point treatment plant for treatment and disposal. Under the recommended wastewater management program in Metro's final plan, sewered areas tributary to the West Point plant would continue to be served by that plant.

Study Area Wastewater Collection Systems

The Metro collection system in the study area consists of approximately 116 miles of interceptors, trunks, force mains, inverted siphons, and tunnels as well as 20 pumping stations. Figure 1-3 shows the location of the Metro collection system, the existing service areas, and local service areas designated by King County's Sewerage General Plan as eligible for sewer service.

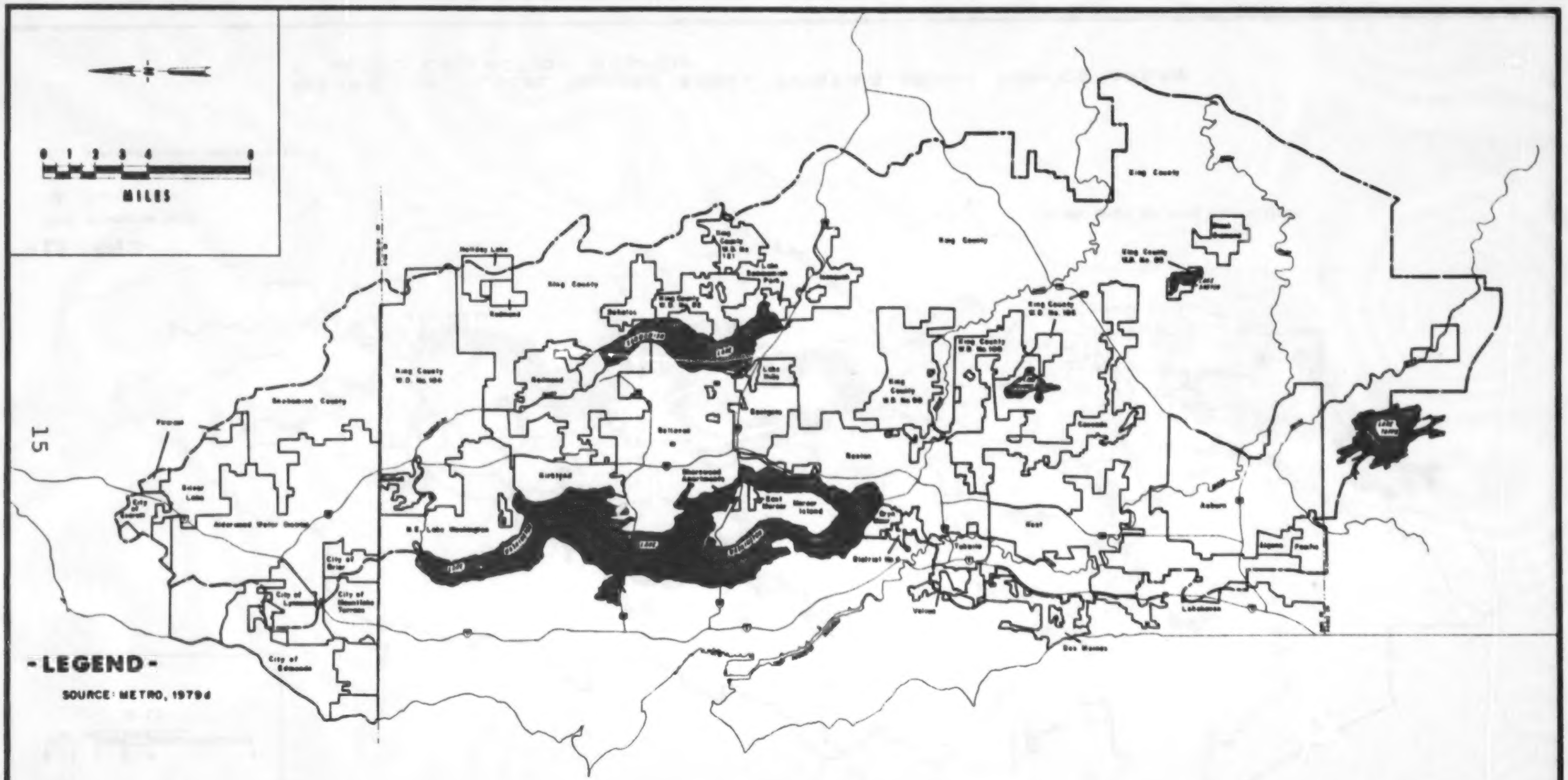
Where sewer lines cross waterways, flows typically are carried underneath the water channel in an inverted siphon, i.e., a pipe which is essentially always full of water and is capable of sustaining some internal pressure without leaking. Similar pressure pipes are called force mains when the pressure is produced by a pumping facility. The Renton division system currently incorporates approximately 5 miles of siphons, ranging from 8-54 inches in diameter, and a total of 10.1 miles of force mains, with diameters ranging from 12-20 inches.

Table 1-2. Renton Study Area Local Sewerage Agencies

No.	Agency	Sewered	Currently (1979) served by:
1	City of Everett	Yes	Everett
2	Fircrest Sewer District	Yes	Everett
3	Snohomish County	No	
4	Silver Lake Water District	No	
5	Alderwood Water District	Yes	Metro (West Point)/Lynnwood
6	City of Edmonds	Yes	Edmonds
7	City of Mountlake Terrace	Yes	Lynnwood
8	City of Brier	Yes	Metro (West Point)
9	City of Lynnwood	Yes	Lynnwood
10	Northeast Lake Washington Sewer District	Yes	Metro (West Point)
11	City of Bothell	Yes	Metro (West Point)
12	King County Water District No. 104	Yes	Metro (West Point)
13	King County	No	
14	Holiday Lake Sewer District	No	
15	City of Kirkland	Yes	Metro (Renton)
16	City of Redmond	Yes	Metro (Renton and West Point)
17	City of Bellevue	Yes	Metro (Renton and West Point)
18	Sahallee Sewer District	Yes	Metro (West Point)
19	King County Water District No. 82	Yes	Metro (West Point)
20	King County Water District No. 121[1]	No	
21	Shorewood Apartments	Yes	Metro (Renton)
22	East Mercer Island Sewer District	Yes	Metro (Renton)
23	Mercer Island Sewer District	Yes	Metro (Renton)
24	King County Water District No. 107	Yes	Metro (Renton)
25	Eastgate Sewer District	Yes	Metro (Renton)
26	Lake Sammamish State Park	Yes	Metro (Renton)
27	City of Issaquah	Yes	Metro (Renton)
28	Bryn Mawr Sewer District	Yes	Metro (Renton)
29	City of Renton	Yes	Metro (Renton)
30	King County Water District No. 90	No	
31	Val-Vue Sewer District	Yes	Metro (Renton and West Point)
32	City of Tukwila	Yes	Metro (Renton)
33	Cascade Sewer District	Yes	Metro (Renton)
34	King County Water District No. 108	Yes	Metro (Renton)
35	City of Kent	Yes	Metro (Renton)
36	City of Auburn	Yes	Metro (Renton)
37	King County Water District No. 86	No	
38	City of Black Diamond	No	
39	City of Algona	Yes	Metro (Renton)
40	City of Pacific	Yes	Metro (Renton)

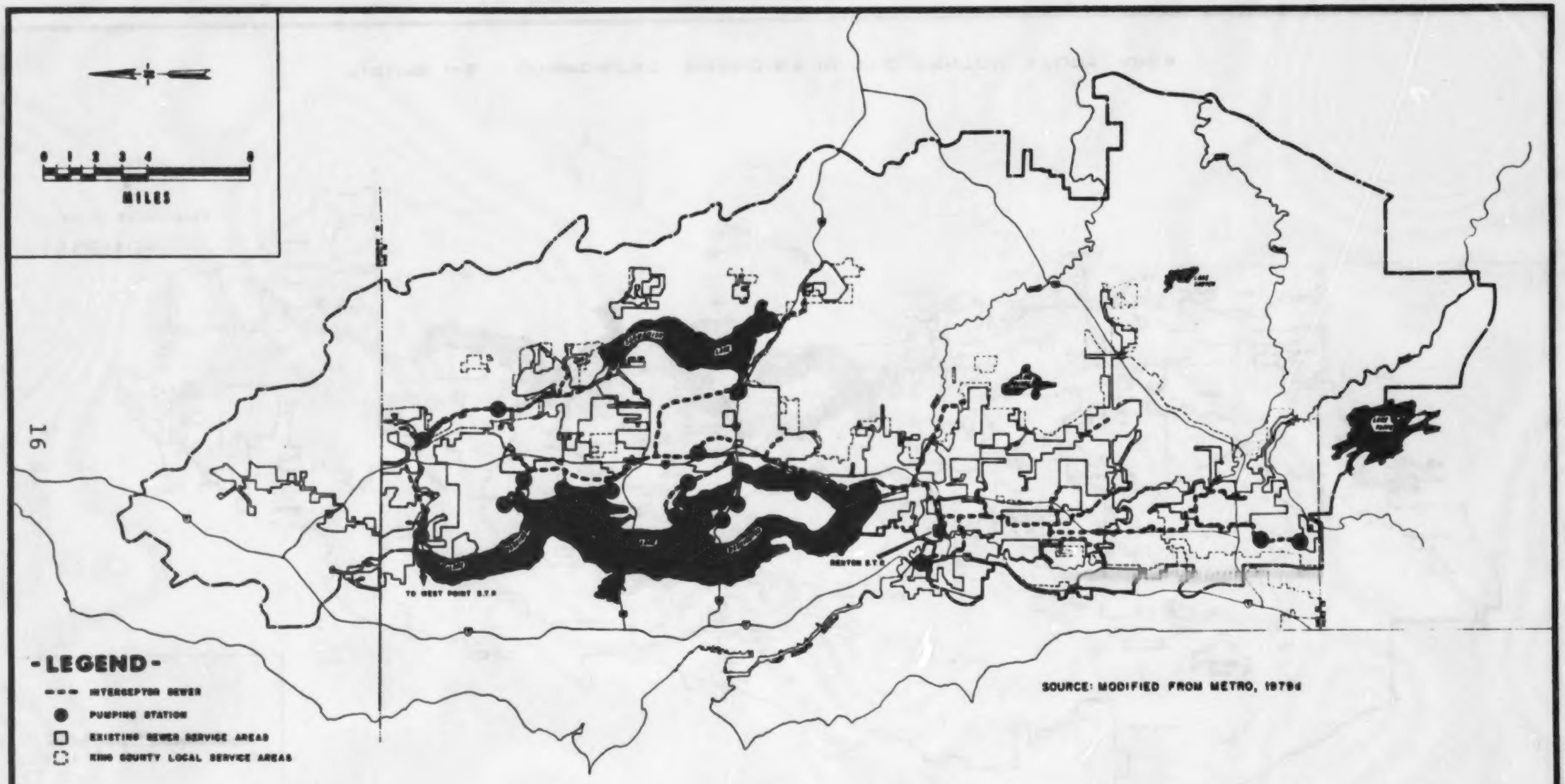
[1] Merged with KCWD No. 82 in 1979.

SOURCE: Metro, 1979d.



SOURCE: METRO, 1979d

FIGURE 1-2. COMPONENT AGENCIES IN THE RENTON STUDY AREA



SOURCE: MODIFIED FROM METRO, 1979d

FIGURE 1-3. LOCAL SERVICE AREAS, EXISTING SEWER SERVICE AREAS & METRO COLLECTION SYSTEM

Almost all of the gravity lines are constructed of reinforced concrete pipe. The force mains and siphons are usually steel, cast iron, or reinforced concrete pipe.

Most of the Renton area sewerage facilities were constructed in the past 20 years; however, some were obtained by Metro from local agencies. With the exception of isolated problems, the sewer system, which is under continued surveillance, is basically in good repair and has rehabilitation plans underway for all known areas of leakage or deterioration. Capacity problems are more critical. Seven pumping stations are presently operating at or greater than 95 percent of firm capacity (pumping capacity with the largest pump out of operation). Three stations (Sunset, Heathfield, and Kenmore) have measured flows above their capacities, which is possible because peak flows are partially stored in the influent sewer.

The Renton Treatment Plant

The Renton treatment plant is situated on the Green/Duwamish River about 13 miles from the location where the river enters Elliot Bay. A detailed description of the Renton plant may be found in Metro's Technical Memo No. 1, from which the following discussion has been summarized.

The plant is designed to treat an average of 36 million gallons per day (MGD) average dry weather flow (ADWF) and an average of 96 MGD peak wet weather flow (PWWF). The wastewater entering the plant is expected to bring about 75,000 pounds per day of biochemical oxygen demand (BOD) and 93,000 pounds per day of suspended solids (SS). This is equivalent to about 250 milligrams per liter (mg/l) of BOD and 310 mg/l SS. The treated wastewater entering the river is currently required to have no more than 15 mg/l of BOD and 15 mg/l SS.

To reduce pollutant loads to meet the discharge limitations (see Table 1-3), the Renton plant has several treatment steps as shown in Figure 1-4. Pollutant removal includes pretreatment, primary treatment (sedimentation), secondary treatment (activated sludge), and chlorination/dechlorination.

The pretreatment process settles coarse grit and uses bar screens to remove the materials larger than 0.75 inch. The objects captured by the screens are transferred hydraulically to a grinder which shreds and pulverizes the screenings so that they may be returned to the influent flow ahead of the bar screens. Raw sewage pumps lift the wastewater to two aerated grit removal channels where the water is aerated

Table 1-3. Existing and Proposed Discharge Limitations for the Renton Wastewater Treatment Plant

Parameter	Units	Existing Limit	Proposed Limit[1]	Typical Amount[2]
Flow	mgd	38	48	39
BOD_5	mg/l	15[3]	10[4]	9[3]
	lb/day	4,755[3]	2,900[4]	4,990[3]
Suspended Solids	mg/l	15	15	11
	lb/day	4,755	4,300	3,730
Fecal Coliform	organisms per 100 ml	200	200	57
pH	units	6.5–8.5	6.5–8.5	6.5–7.1
Chlorine Residual	mg/l	0.5	0.008	0.26
Ammonia	lb/day	—	2,700	--
Ammonia (unionized)	mg/l	--	0.08	16.6
	lb/day	—	24.02	--
Nitrite	mg/l	—	0.24	--
Oil and Grease	mg/l	--	15	2.4–20
Cadmium	mg/l	0.004	0.0016	<0.004
Chromium (Total)	mg/l	0.02	0.10	0.015
Copper	mg/l	0.04	0.008	0.03
Lead	mg/l	0.05	0.021	0.009
Mercury	mg/l	0.0015	0.0002	0.0013
Nickel	mg/l	0.03	0.10	0.019
Zinc	mg/l	0.09	0.004	0.05
Silver	mg/l	—	0.00068	--

Source: 1 DRAFT NPDES Waste Discharge Permit for the Municipality of Metropolitan Seattle, Renton Sewage Treatment Plant (March 1980)

2 NPDES Discharge Monitoring Report for the Renton Treatment Plant (January 1979–March 1980).

[3] Total

[4] Carbonaceous

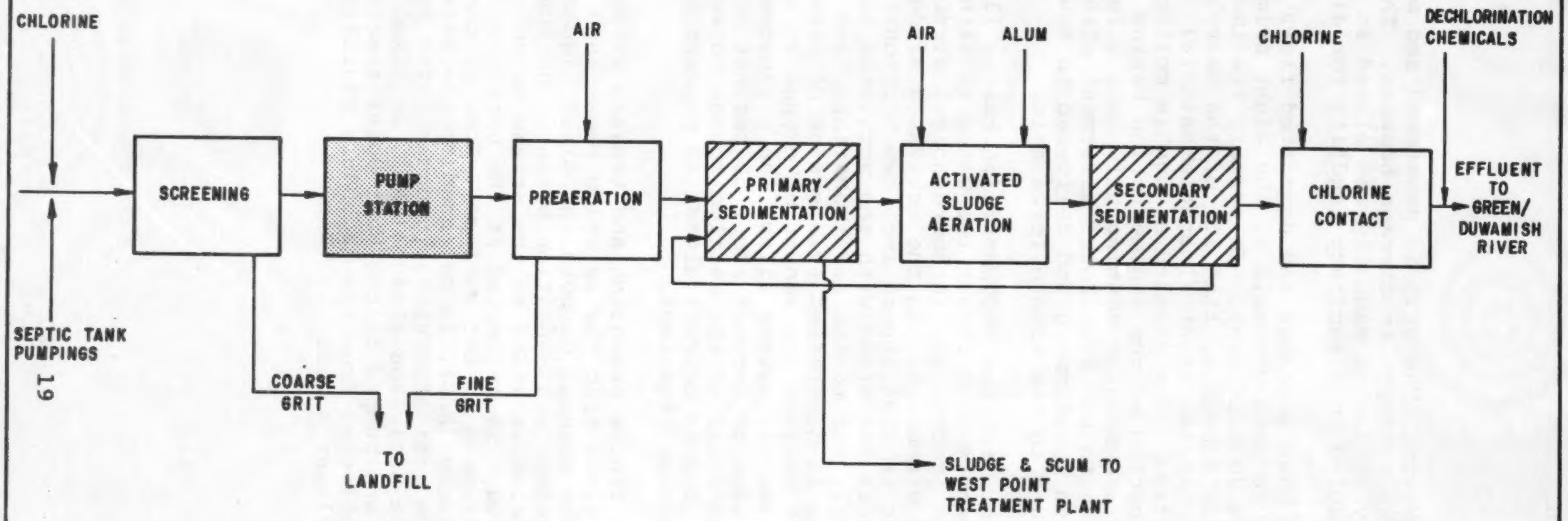


FIGURE 1-4. PROCESS SCHEMATIC OF RENTON TREATMENT PLANT

and fine grit is removed. The grit is dewatered and moved by a mechanical screw conveyor to storage hoppers. The coarse grit is periodically collected manually and placed in the hoppers. Grit is hauled to a sanitary landfill for disposal.

Water that has been screened and degritted flows by gravity through two aerated channels to the eight primary sedimentation basins (clarifiers). In primary treatment, the water velocity is slowed so that all of the heavy material (sludge) can settle and the light floatable material (scum) can rise to the surface. The primary sludge is collected by scrapers on the bottom of the sedimentation basins. Sludge is currently pumped and metered continuously into a force main for transmission to the West Point treatment plant. The scum is collected by skimmers and delivered to scum pumps where it is discharged to the sludge force main.

Primary effluent from the sedimentation basins flows into collection channels that direct the water to either the activated sludge process or, in emergencies, directly to chlorination and discharge. In the activated sludge process, the wastewater is distributed into two horizontally baffled aeration tanks and mixed with the activated sludge. Six air blowers supply air to the aeration tanks, and the concentration of air is controlled by a system of dissolved oxygen probes, which measure the amount of oxygen in the aeration tanks. Dissolved oxygen allows the organisms present in the activated sludge to convert about 50 percent of the oxygen-demanding materials in the settled sewage to water and carbon dioxide, and to convert almost 50 percent more to more activated sludge organisms.

The mixture of sludge organisms and treated wastewater (mixed liquor) overflows from the aeration tanks into an aerated channel. The channel directs the mixed liquor into eight circular secondary sedimentation basins. During high wet weather flows, alum is added to the stream to enhance sludge removal. Sludge is collected at the bottom of the basin and scum is skimmed at the surface. Some of the sludge, return activated sludge (RAS), is returned to the aeration tank to maintain the activated sludge process. The remainder of the sludge, waste activated sludge (WAS), is mixed with the primary sludge and pumped to the West Point treatment plant. The scum collected from the secondary clarifiers is piped to the influent sewer.

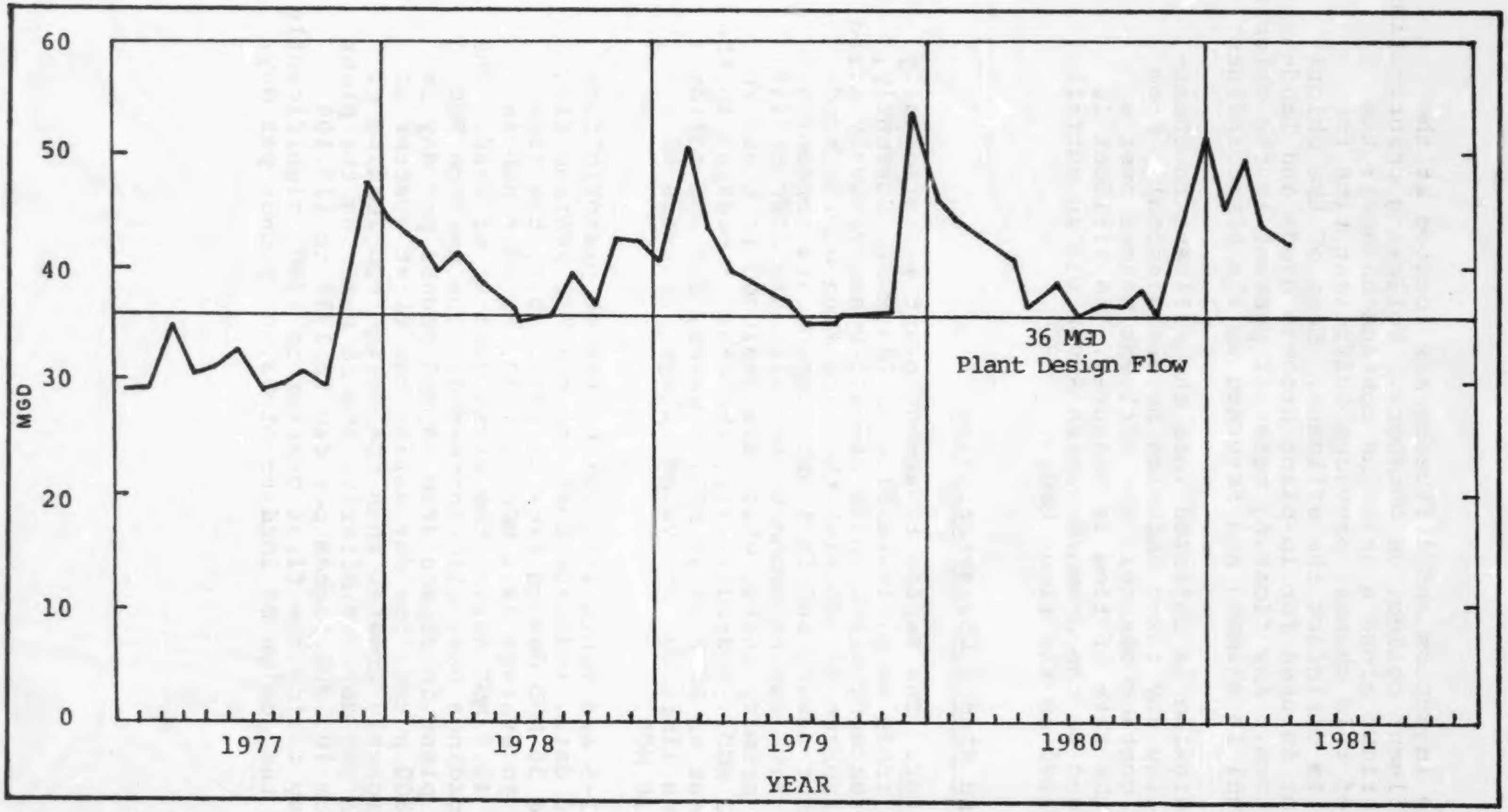
Chlorine injectors and diffusers are located at the secondary effluent collection chambers. Following chlorination, the effluent flows along a chlorine contact channel; the long length of this channel provides sufficient time for the chlorine to disinfect the effluent. Some of the chlorinated effluent is used for in-plant process needs and landscape irrigation. Any floating material present in the chlorine contact channel is skimmed and returned to the plant influent.

Sulfur dioxide is injected into the effluent to chemically neutralize any toxic chlorine before disposal. From the chlorine contact channel, the effluent passes over a weir, where the rate of flow is measured; the effluent is then discharged to the Green/Duwamish River via an outfall diffuser located on the river bed.

Wastewater and Sludge Characteristics

Wastewater. The Renton treatment plant was originally conceived to treat an ultimate flow of 144 MGD. Currently, the Renton treatment plant units are all conservatively sized to treat an average 36 MGD with the exception of the headworks, influent sewer, and influent pumping and screening structures, which can accommodate the ultimate ADWF of 144 MGD, and the primary units, which are designed to treat an average of 72 MGD. Hydraulically, the other processes in the plant may treat an ADWF of 48 MGD; however, BOD and solids concentrations limit the activated sludge processes to a capacity of 36 MGD.

Figure 1-5 and Table 1-4, which present historic flow and wasteload data, indicate that the monthly average flow was below the 36 MGD design flow in 1977. But, the flow increased to an average 39.4 MGD in 1978, to 38.4 MGD in 1979, and to 42.5 MGD during the first quarter of 1980. The BOD and SS loadings have also increased. The average BOD entering the plant increased from 84,900 pounds per day in 1979 to 141,800 pounds per day during the first quarter of 1980, significantly greater than the design BOD loading of 75,000 pounds per day. Similarly, the SS entering the plant increased from 103,900 pounds per day in 1979 to 117,100 pounds per day during the first quarter of 1980, significantly greater than the design SS loading of 93,000 pounds per day.



* MONTHLY AVERAGES OF DAILY INFLUENT FLOW

SOURCE: METRO, 1981

FIGURE 1-5. RENTON TREATMENT PLANT WASTEWATER FLOWS*

Table 1-4. Influent and Effluent BOD* and SS* Quantities

Month	Flow	BOD, 1000 lb/day		SS, 1000 lb/day	
1979	mgd*	Influent	Effluent	Influent	Effluent
January	39.33	105.4	5.4	142.7	5.1
February	48.51	123.4	13.0	204.3	13.9
March	41.90	141.5	6.9	208.6	4.2
April	38.12	137.6	4.2	169.7	2.5
May	36.86	105.1	5.5	130.0	2.3
June	35.50	86.1	4.4	103.6	1.6
July	33.55	81.1	3.6	99.1	1.6
August	33.22	73.4	3.3	83.4	2.4
September	34.08	79.6	3.5	96.6	2.0
October	34.61	73.6	3.7	97.9	2.7
November	39.55	87.9	3.7	108.1	2.9
December	50.84	95.8	5.4	127.2	4.8
AVERAGE	38.4	84.9	5.2	130.9	3.8
1980					
January	44.48	99.6	3.8	134.8	4.6
February	42.10	247.5	3.7	112.3	2.3
March	40.85	78.4	3.6	104.3	2.6
AVERAGE	42.50	141.8	3.7	117.1	3.2

*NOTE

BOD - Biochemical Oxygen Demand
SS - Suspended Solids
mgd - million gallons per day

Source: Metro internal memos: Renton Treatment Plant Monthly Process Analysis (for the above months).

The Renton treatment plant has been operating in a stressed mode for nearly 2 years. However, the effluent BOD and SS leaving the plant and entering the river have generally been within the existing state discharge limitations (see Table 1-4). The requirements are 4,755 pounds per day of BOD and 6,338 pounds per day of SS. During 1979 the average effluent BOD loading was 5,200 pounds per day and the average effluent SS loading was 3,800 pounds per day. For the first quarter of 1980, the BOD loading was 3,700 pounds per day, and the SS loading was 3,200 pounds per day. The plant is meeting its discharge limits because it was designed with several back-up measures to provide reliability during higher flows. Among the back-up features are flow storage in the influent sewer, inherent resiliency of the activated sludge process, use of chemicals to improve sludge settling, providing secondary treatment to only part of the flow, and the capability of diverting 2-4 MGD to the West Point plant via the pressurized sludge line.

Besides BOD and SS, other characteristics of the wastewater have an influence on the quality of the discharge from the plant. Among those characteristics are nitrogen, phosphorus, pH, temperature, grease and metals. Typical concentrations of these other constituents during 1979-1980 are tabulated in Table 1-5.

Sludge. The raw primary sludge and WAS collected during treatment at the Renton plant are pumped in a force main to the West Point plant for treatment. No sludge is currently treated at the Renton plant. Figure 1-6 shows the amounts of sludge that have been sent to the West Point plant for the period January 1978 through March 1980. Metro does not compile separate data on the quality of Renton plant sludge.

Renton treatment plant sludge makes up approximately 40 percent of the influent SS to the West Point plant, and is creating severe operational problems for the West Point plant. The sludge is pumped from the Renton plant as dilute as possible in order to keep the sludge force main detention times short, thus minimizing sulfide corrosion and odor problems at the force main discharge points and maintaining the flow in the gravity collection sewer as high as possible.

Existing Chemical Consumption

Four chemicals are used in the Renton system: chlorine, sulfur dioxide, alum and hydrogen peroxide. Chlorine is used as a disinfectant to reduce the bacteria population in the effluent to a safe level. Sulfur dioxide is used to neutralize any of the residual chlorine not used up in

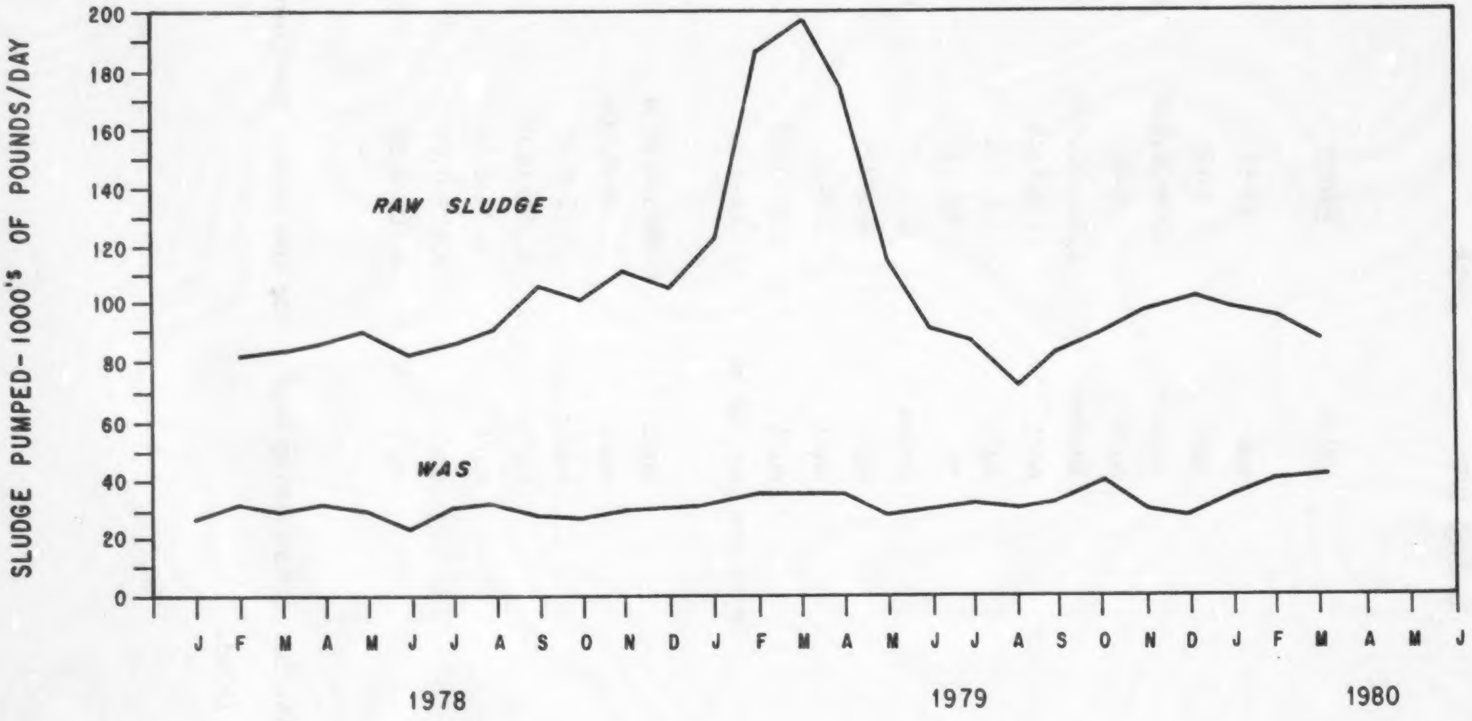
Table 1-5. Renton Treatment Plant Effluent Characteristics

January 1979 - March 1980[1]

Parameter	Units	Range	Average
Flow	mgd	33-51	39
BOD_5	mg/l	5-17	9
	lb/day	1,360-35,000	4,990
SS	mg/l	5-26	11
	lb/day	1,580-10,000	3,730
NH_3-N	mg/l	11.3-13.9	13.7
Phosphorus[2]	mg/l	3.2-7.1	4.3
Temperature[2]	°F	56-73	--
pH	units	6.1-8.5	6.5-7.1
Dissolved Oxygen[2]	mg/l	4.5-8.9	7.0
Grease[2]	mg/l	2.4-20	—
Chlorine Residual	mg/l	0.20-0.29	0.26
Fecal Coliform	Organisms per 100 ml	14-116	57
Mercury	mg/l	0.0003-0.0034	0.0013
Cadmium	mg/l	0-<0.004	<0.004
Copper	mg/l	0.02-0.05	0.03
Lead	mg/l	0.001-<0.02	0.009
Zinc	mg/l	0.03-0.10	0.05
Nickel	mg/l	0.008-0.03	0.019
Chromium (Total)	mg/l	0.005-0.03	0.015

Source: 1 NPDES Discharge Monitoring Report for the Renton Treatment Plant

2 Metro, 1979d.



SOURCE: METRO, 1979d

FIGURE 1-6. POUNDS OF SLUDGE PUMPED TO WEST POINT

the disinfection process, since residual chlorine discharged to the receiving water can be toxic to fish. Alum is used as a coagulant to enhance solids removal in the secondary sedimentation step; alum is used only when the flow in the plant is greater than the design capacity. Finally, hydrogen peroxide is introduced to the sludge force main to control the effects of corrosion of the sewer pipe by hydrogen sulfide.

Chlorine and sulfur dioxide are used in the greatest quantities because they are added continuously; alum and hydrogen peroxide are used in smaller amounts because they are used on an intermittent basis. During January 1979 through March 1980, chlorine was used at a rate of 27 pounds per million gallons (190 tons per year) and sulfur dioxide was used at a rate of 9 pounds per million gallons (67.5 tons per year). Alum is used intermittently during high flow periods, and during 1979 was used at an average rate of 9 pounds per million gallons (78 tons per year). Because flows are continually increasing, even greater quantities of alum will be required in the future; the estimated alum use in 1981 is about 28 pounds per million gallons (243 tons per year). About 9,000 gallons of hydrogen peroxide was required in 1979 and about the same amount should be required in 1980.

Existing Energy Use

In many wastewater treatment plants, energy needs are partially met by gas produced on-site by the digestion of sludge. Since the Renton treatment plant sludge is pumped to the West Point plant, the Renton plant's energy needs are met exclusively by purchased electricity. Figure 1-7 graphically depicts the energy use and costs at the Renton plant from 1971 to present. As shown in this figure, the electrical energy used has remained fairly constant through the years, due mainly to energy conservation efforts. In spite of these conservation efforts, rapid escalation in the unit power rate has resulted in a very significant increase in the total power bill. Figure 1-7 also illustrates that the power bill increased at a rate significantly greater than the plant flow. In the future, the plant power bill can be expected to generally increase in proportion to the power rate, because conservation efforts are reaching the maximum obtainable limits at the existing plant. Therefore, future increases in the plant power bill will be even more dramatic than in the past.

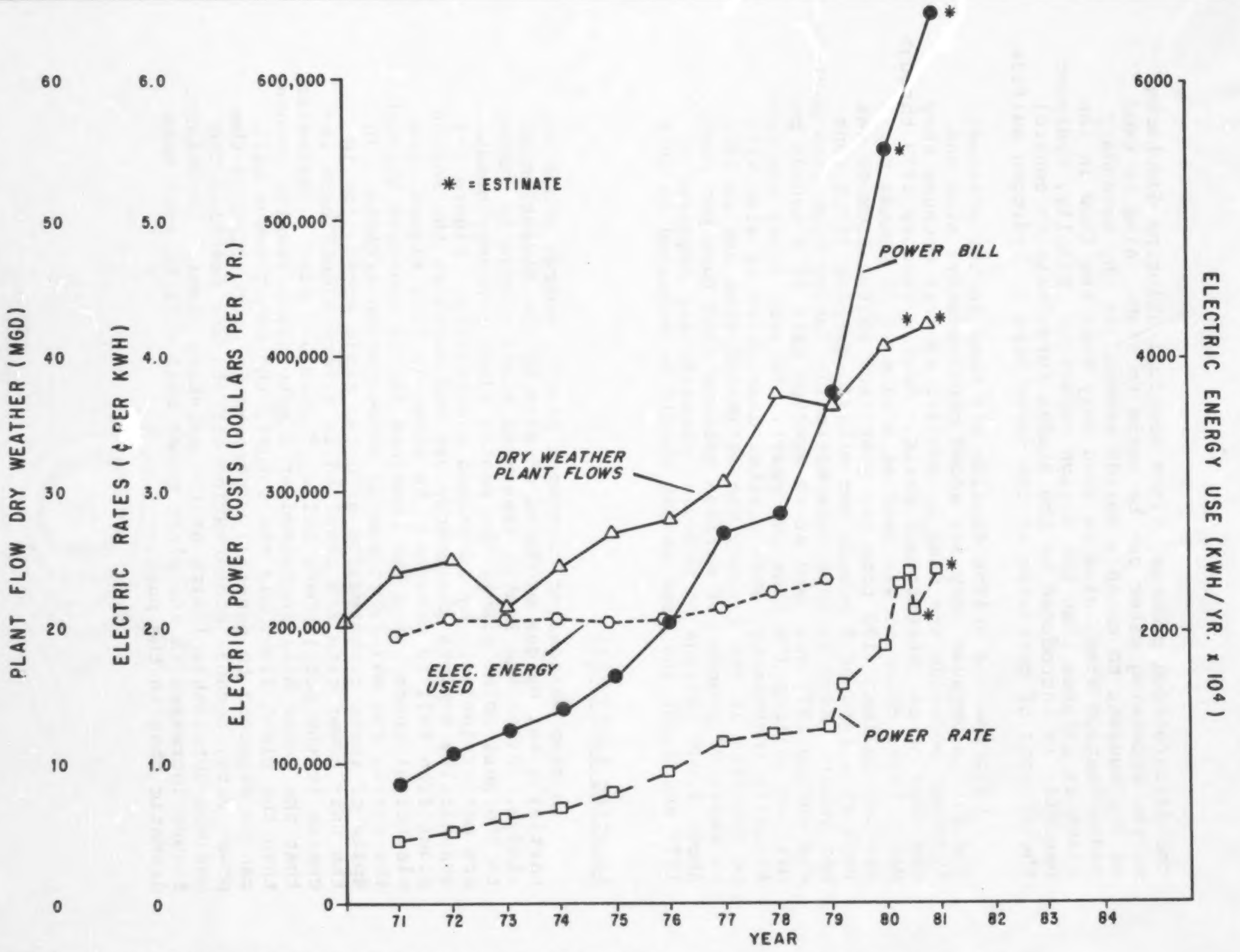


FIGURE 1-7. RENTON TREATMENT PLANT ELECTRIC POWER COST VS. TIME
SOURCE: METRO, PERS COMM., 1980

Existing Costs of Wastewater Treatment

The cost of treating wastewater is generally proportional to the amount of wastewater treated: when more wastewater is treated, more chemicals are required, more labor and materials are needed to maintain the equipment, and more energy is needed to add air to the water. Table 1-6 displays the historic costs of wastewater treatment at the Renton plant.

The Nonsewer Area

About 75 percent of the study area is not sewered. The residents of this area rely primarily on conventional septic tanks and drainfields for wastewater treatment and disposal. Authorities having the main responsibility for regulating on-site wastewater disposal are the health departments in King, Snohomish and Pierce Counties. King County health officials have estimated that from 50,000-100,000 such systems may be in use, with 80,000 a realistic number (Metro, 1979d). However, most of the soil types in the nonsewer area have severe wastewater disposal limitations due to insufficient depth, slow permeability, flood hazards, or high groundwater.

Septic tanks, as part of their regular maintenance, need to be pumped to remove the solids accumulation. If all on-site systems were being pumped on a once-in-three year basis, approximately 27 million gallons of septage per year would be generated (Metro, 1980d). The Renton treatment plant receives most of the septage from the study area. Recent billing records at the Renton plant show that about 11 million gallons of septage are being treated on an annual basis. A full-scale septic tank maintenance program would therefore increase considerably the septage quantities received at the Renton plant.

Some "alternative" systems (other than septic tanks) have been installed in the study area. Those systems include composting toilet and mound systems. However, the alternatives are relatively new and their performance has not been fully evaluated.

Table 1-6. Costs of Wastewater Treatment at the Renton Plant

Year	Average Daily Flow mgd	Operation & Maintenance $/mg	Depreciation $/mg	Estimated Transmission $/mg	Total Cost $/mg
1974	28.42	76.70	29.14	27.80	133.64
1975	31.74	29.95	47.34	10.85	148.14
1976	30.84	90.99	47.50	32.97	171.46
1977	32.90	106.99	49.43	38.77	195.19
1978	39.45	112.62	49.43	40.81	202.86
1979	40.27	129.75	49.43	47.02	226.20

SOURCE: Metro, 1980, pers. comm.

Chapter 2

DESCRIPTION OF RECOMMENDED PROGRAM AND EIS APPROACH

Introduction

This chapter describes the Metro recommended wastewater management program for the study area. Separate sections first describe the process for selecting the recommended program, and the various elements of the recommended program. The approach to the EIS evaluation of the recommended program and alternative programs is then described.

Process for Selecting Recommended Program

In the Draft EIS, four wastewater management alternatives for the study area were evaluated in detail. These were Alternative A-1, involving continued discharge of Renton effluent to the Green-Duwamish River with nitrification; Alternative A-3, involving construction of a tunnel and outfall to Puget Sound off Three Tree Point/Seahurst Park; Alternative A-5, involving construction of a tunnel and outfall to Alki Point/Duwamish Head; and Alternative B-1, involving continued discharge of Renton effluent to the Green-Duwamish River with nitrification, plus construction of a new Kenmore treatment plant to treat flows from the north part of the study area. A detailed description of each of the four final alternatives is presented in Chapter 4 of the EIS.

In the Draft Wastewater Management Plan for the Lake Washington/Green River Basins, Metro selected Alternatives A-3/A-5 as the preferred long-term wastewater management program. Although Alternative A-1 was the least cost alternative, Alternatives A-3/A-5 were judged to have "overriding benefits" justifying the increased costs. The overriding benefits were improved water quality protection and reduced operation and maintenance costs. The process of selecting Alternative A-3/A-5 as the preferred program is described in greater detail in Chapter 4 of the EIS.

Alternatives A-3/A-5, as recommended in Metro's draft plan, called for expansion of the Renton treatment plant to 99 MGD to service the entire sewer service area; construction of solids handling facilities at the Renton site; wastewater treatment with conventional secondary processes;

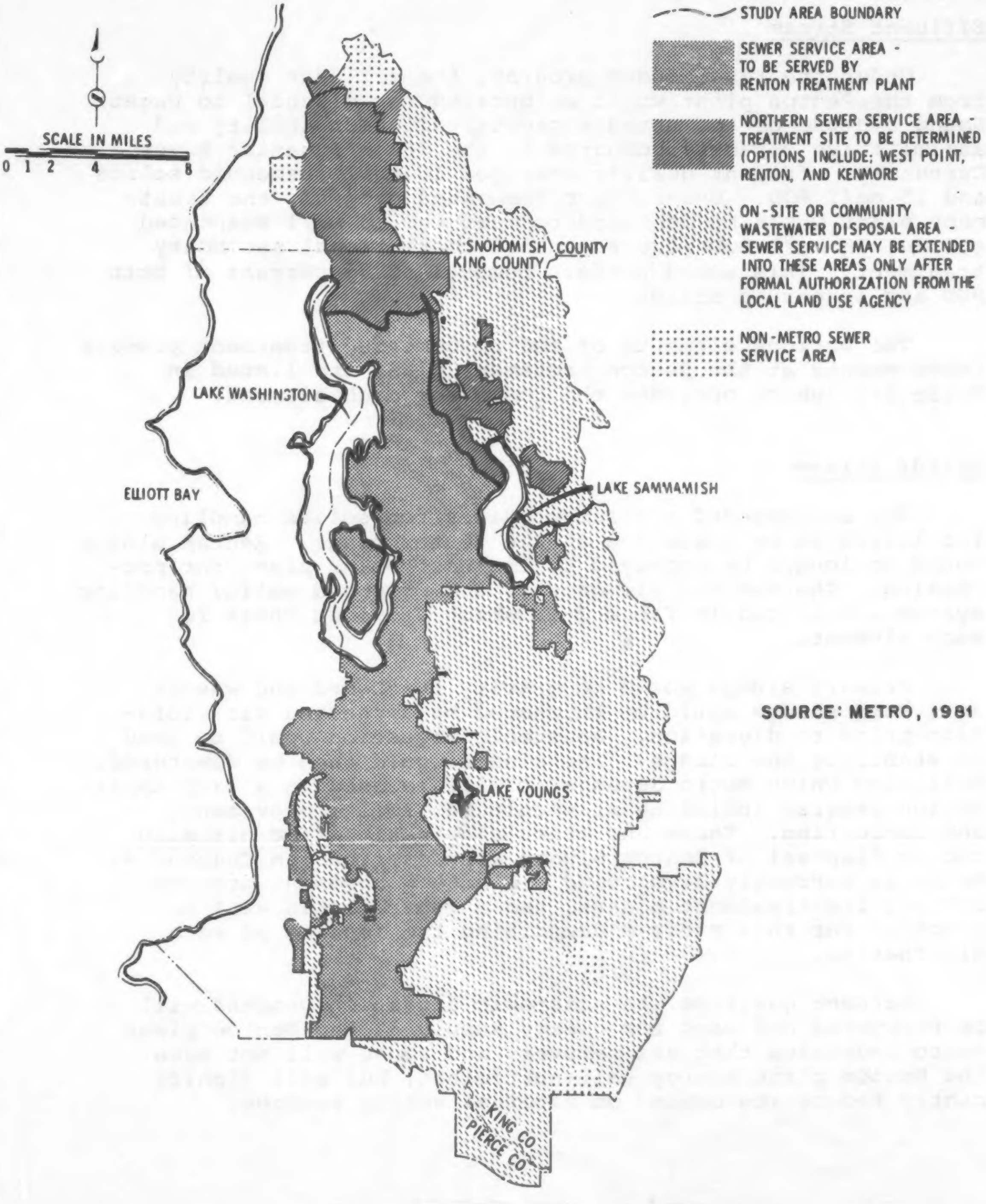
and diversion of treated wastewater by means of a tunnel to either the Three Tree Point/Seahurst Park area or the Alki Point/Duwamish Head area. (The Duwamish Head alternative was not considered in the draft plan or EIS, but has been considered in the final plan and EIS.)

Metro subsequently recommended a selected tunnel and outfall route to Puget Sound in the Final Wastewater Management Plan. Six alternative routes were considered: Seahurst Park (Route A), Lake Burien (Route B), Three Tree Point (Route C), West Duwamish (Route D), East Duwamish (Route E), and Duwamish Head (Route F). The final plan considered differences in costs, land use impacts, and water quality benefits among the alternatives, and concluded that Seahurst Park route should be selected. Key reasons cited by Metro for this decision were that: 1) even considering potential savings from sharing the costs of an Alki outfall with other proposed Metro projects, a Seahurst Park alternative would still be $32.2 million less expensive; 2) implementation of the projects which could result in cost sharing is uncertain; 3) adverse land use impacts would be encountered along any of the routes; and 4) the Seahurst Park site is a more than adequate receiving water.

Description of the Recommended Program

Under the recommended program described in Metro's final plan, the Renton treatment plant would be expanded to 72 MGD to treat year 2000 flows from the existing Renton service area. Wastewater flows from the Renton service area were 40 MGD in 1980, and are projected to increase to 59 MGD by 1990 and to 73 MGD by the year 2000. The Renton plant service area recommended by Metro's final plan is shown in Figure 2-1.

It should be noted that Metro's draft plan recommended expansion of the Renton treatment plant to 99 MGD, with a first phase expansion to 72 MGD, to treat flows at Renton from sewered areas currently tributary to West Point, as well as flows from sewered areas tributary to the Renton plant. This required the construction of the Redmond and North Creek/Hollywood connections to transfer flows from the West Point service area to the Renton plant. Metro has since postponed a recommendation on the Redmond and North Creek/Hollywood connections until after a decision is made on the West Point secondary treatment waiver application currently being reviewed by EPA. Accordingly, a final decision on these collection facilities will follow the West Point waiver decision process, and may include a supplemental facilities plan and supplemental EIS for the West Point plant. Metro has indicated that the final plan retains flexibility to accept Redmond and North Creek/Hollywood connection flows. Alternatively, a future decision could be made to build a Kenmore plant to treat waste flows from the north part of the study area beyond the year 2000.


STUDY AREA BOUNDARY
SEWER SERVICE AREA - TO BE SERVED BY RENTON TREATMENT PLANT
NORTHERN SEWER SERVICE AREA - TREATMENT SITE TO BE DETERMINED (OPTIONS INCLUDE; WEST POINT, RENTON, AND KENMORE
ON-SITE OR COMMUNITY WASTEWATER DISPOSAL AREA - SEWER SERVICE MAY BE EXTENDED INTO THESE AREAS ONLY AFTER FORMAL AUTHORIZATION FROM THE LOCAL LAND USE AGENCY
NON-METRO SEWER SERVICE AREA
SCALE IN MILES
0 1 2 4 8
SNOHOMISH COUNTY
KING COUNTY
LAKE WASHINGTON
ELLIOTT BAY
LAKE SAMMAMISH
LAKE YOUNGS
KING CO.
PIERCE CO.

SOURCE: METRO, 1981

FIGURE 2-1. RECOMMENDED RENTON SERVICE AREA

Effluent Stream

Under the recommended program, the effluent quality from the Renton plant would be derated for disposal to Puget Sound because of the sound's greater dilution ability and assimilative capacity compared to the Green-Duwamish River. Currently, effluent quality averages 10 mg/l suspended solids and 15 mg/l BOD. Under the recommended program, the treatment plant would be designed to meet the 30 mg/l suspended solids, 30 mg/l BOD requirement of conventional secondary treatment. This would achieve removal of 85 percent of both BOD and suspended solids.

The various elements of the recommended treatment process improvements at the Renton treatment plant are listed in Table 2-1, which provides the costs for each element.

Solids Stream

The recommended program provides for solids handling facilities to be installed at the Renton plant. Renton sludge would no longer be conveyed to the West Point plant for processing. The various elements of the proposed solids handling system are listed in Table 2-2, which provides costs for each element.

Primary sludge would be gravity thickened and waste-activated sludge would be thickened by dissolved air flotation prior to digestion. Anaerobic digestion would be used to stabilize the sludge. The sludge would then be dewatered, following which Metro assumes it will be used in a land application program including silviculture, soil improvement, and composting. These and other alternatives for ultimate use or disposal of Renton sludge are described in Chapter 4; Metro is currently developing a sludge management program for all its treatment plants, and a separate EIS will be prepared for this program describing the impacts of each alternative.

Methane gas from the anaerobic digestion process will be recovered and used for energy supply at the Renton plant. Metro indicates that gas recovery and reuse will not make the Renton plant energy self-sufficient, but will significantly reduce its demand on external energy sources.

Table 2-1. Liquid Stream Design Parameters, 30/30 Effluent

Unit	Existing	72 mgd
Primary Sedimentation System		
Number	8	[a]
Width, ft.	34	
Length, ft.	164	
Average water depth, ft.	9	
Detention time, AWWF, hours	2.25	1.0
Overflow rate, AWWF, gal/sq ft/day	860	1,600
Secondary Aeration System		
Tanks		
Number	8	4
Width each pass, ft.	30	30
Length each pass, ft.	317.5	317.5
Average water depth, ft.	15	15
Detention time, AWWF, hours	6.42	4.3[b]
BOD loading, lb applied/cu ft/day	42.6	76
Secondary Clarification System		
Number	8	8
Diameter, ft.	100	100
Average water depth, ft.	14/18[c]	18
Detention time, AWWF, hours	5.4/5.7	5.7
Overflow rate, AWWF, gal/sq ft/day	572	572

[a] Dependent upon full scale test results.

[b] Derating increases module from 18 to 24 mgd.

[c] Four at 14 feet, four at 18 feet.

SOURCE: Metro 1981.

Table 2-2. Renton Solids Facilities Design Parameters

Unit	Expansion to 72 mgd
Anaerobic digestion	
Tanks	
Number	4
Diameter, ft	120
Sidewater depth, ft	40
Volume, 1000 cu ft total	1,810
Loading	
Hydraulic detention, days average	24
Total solids, lb/cu ft/day	0.12
Volatile solids, lb/cu ft/day	0.09
Gas production	
Volatile destruction, percent	55
Gas production, cu ft/ lb volatiles destroyed	16
Gravity thickeners	
Tanks	
Number	4
Diameter, ft	45
Depth, ft	
Loading	
Primary solids, lb/sq ft/day	22
Thickened sludge concentration, percent	5
Capture, percent	95
Dissolved air flotation	
Tanks	
Number	4
Diameter, ft	50
Loading	
Waste activated sludge, lb/sq ft/day	10.3
Thickened solids concentration, percent	3
Capture, percent	90
Dewatering	
Feed solids, percent	3
Cake, percent	30
Capture, percent	95
Dewatering Storage/Blending	
Tanks	1
Volume, 1000 cu ft	453
Detention time, days	6.5
Mechanical solids facilities	Compatible with dewatering equipment. Annual average of 60 dry tons per day.
Energy recovery	To be based on energy study.

SOURCE: Metro 1981.

Effluent Disposal

The recommended program calls for construction of a tunnel and outfall off Seahurst Park. The proposed route is shown in Figure 2-2. The various elements of the tunnel and outfall are listed in Table 2-3; cost estimates are shown in Table 2-4. Two pump stations would be required, one at the treatment plant site and another at the tunnel's western portal at Seahurst Park. The tunnel and outfall have been designed to accommodate average flows of 144 MGD and peak flows of 325 MGD (the difference between 144 and 325 MGD represents capacity for storm flows). These flows represent 50-year flows from the sewered portions of the entire service area, including Redmond connection and North Creek/Hollywood connection flows. If the Redmond and North Creek/Hollywood connections are not built, then capacity considerably in excess of 50-year capacity would exist in the tunnel and outfall.

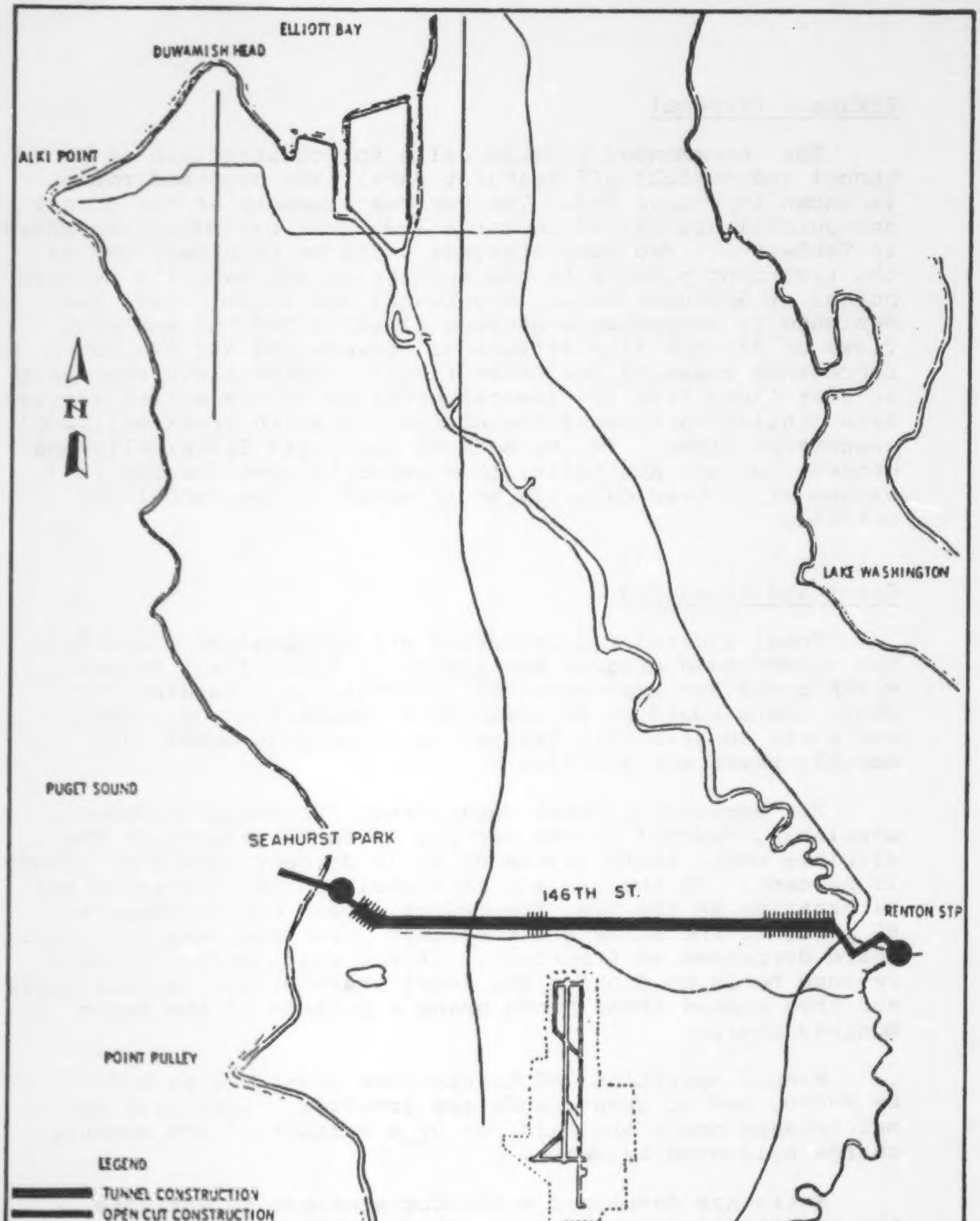
Costs and Financing

Total capital and operation and maintenance costs for the recommended program are listed in Table 2-4. Present worth costs are approximately $225 million. Funding for these costs would be provided by a combination of federal and state construction grants, local revenue bonds, and monthly sewer service fees.

For approved capital facilities, for which funding is available, federal grants can pay up to 75 percent of the eligible cost, state grants up to 15 percent, and local funds 10 percent. If the project is classified as innovative and alternative by the EPA, the federal grant can increase to 85 percent, the state grant becomes 9 percent, and the local share decreases to 6 percent. In the past, Metro has sold revenue bonds to finance the local share of the capital costs, and then repaid these bonds using a portion of the Metro monthly charge.

Annual operation and maintenance costs are paid for by Metro, and no grant funds are involved. Operation and maintenance costs are paid for by a portion of the monthly charge collected by Metro.

Metro has developed a funding scenario to estimate the impacts of its plan on monthly sewer rates. This scenario assumes that the following items would be eligible for state and federal grants: capital costs of expanding the treatment plant to accommodate existing wastewater flows; capital costs of constructing solids processing facilities to accommodate solids currently transferred to the West Point plant; and capital costs for constructing that portion of the tunnel and outfall to Puget Sound which accommodates existing wastewater flows.



SOURCE: METRO, 1981

FIGURE 2-2. PROPOSED TUNNEL/ OUTFALL ROUTE

Table 2-3. General Tunnel/Outfall Information

Route	Element	Capacity	Number and Estimated Size	Approximate Length, Ft.	Approximate Depth, Ft.
Seahurst Park*	Outfall	144 mgd average flow 325 mgd peak flow	one at 96 inches	3,000	200+ (diffuser)
	Tunnel	144 mgd average flow 325 mgd peak flow	one at 120 inches	27,000	100-400
	Force Mains	144 mgd average flow 325 mgd peak flow	two at 72 inches	4,000	minimum 4 to 6 feet of cover
	Pump Stations	325 mgd peak flow	two at 10,000 sq. ft.	----	surface structure

* The Seahurst Park tunnel/outfall route requires the acquisition of a construction staging site (approximately one acre in size) at each tunnel portal. Easements will also be required at three separate sites along the tunnel route identified in Figure 3-6.

SOURCE: Metro 1981.

Table 2-4. Cost of Recommended Improvements[a]

Item	Project Cost, Million $
Liquid Stream (72 mgd)	
Primary	0
Aeration	13.1
Clarifiers	16.8
Chlorination and dechlorination	0.4
Subtotal	30.3
Solids Stream (72 mgd)	
Gravity thickening	3.1
DAF	6.7
Anaerobic digestion	22.7
Dewatering	8.4
Gas recovery	5.7
Mechanical solids handling	2.0
Subtotal	48.6
Effluent Disposal (144 mgd)	
Outfall	9.2
Tunnel	102.2
Force Main	7.6
Pump stations	21.0
Land and easements	0.2
Subtotal	140.2
Total Project Cost	219.1
Annual O/M[b]	5.8
Present Worth	225.4

[a] Based on ENR-CCI = 3500, mid-1980 USWRC discount rate 7-1/8 percent.

[b] Average over the planning period.

SOURCE: Metro 1981.

Metro has developed a funding scenario which assumes that 33 percent of the state and federal construction grants available in Washington would be allocated to Metro. Future monthly sewer rates, given this scenario, are shown in Figure 2-3. This graph shows the amount of increase attributable solely to the Renton program, and a range of increases attributable to alternative improvements at the remaining Metro plants discharging to Puget Sound. As shown, monthly sewer rates could vary between about $15 per month to about $33 per month, depending on the decision made regarding Metro's Puget Sound plants.

Alternatives for the Nonsewer Area

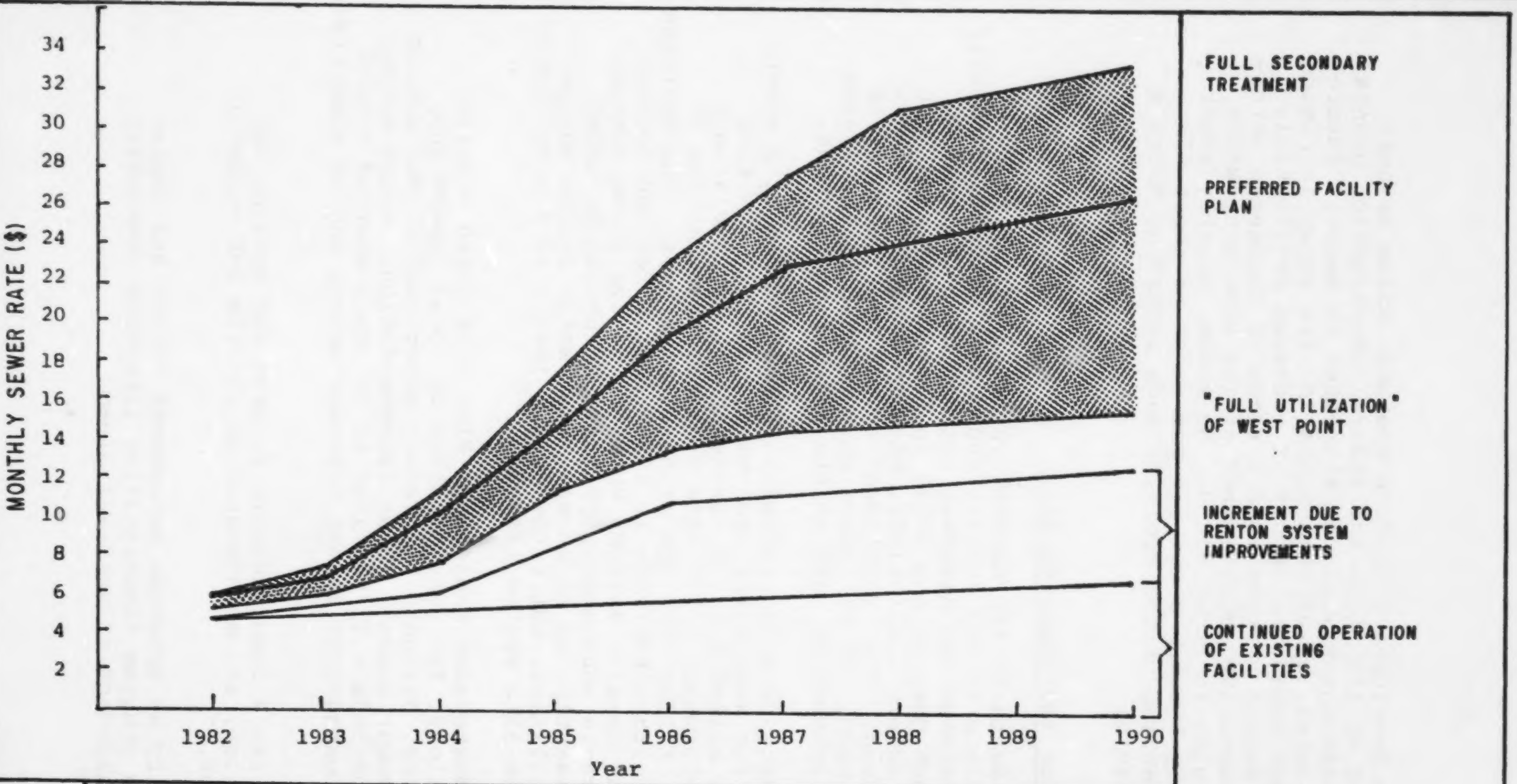
Most residents in the nonsewer portion of the study area will continue to use on-site individual or small community wastewater treatment and disposal methods over the next 20 years. Although many of the soils in King County have been found to have severe limitations, on-site methods have been successfully used. The traditional septic tank/leach field system can be used, but diligence must be used in the design, construction, inspection, and maintenance of the systems.

In the past, on-site systems have been viewed as a short-term solution for wastewater treatment. In 1977 the King County Council called for the strengthening of regulations to improve performance of on-site systems, thus, moving in the direction of long-term use of on-site systems. The Seattle-King County Health Department in 1980 adopted revised regulations governing on-site systems which recognize these systems as long-term waste management options. It should be noted that Metro presently has no on-site wastewater system management responsibilities, but rather views itself as a facilitator in resolving on-site system issues.

Metro's Wastewater Management Plan sets forth a series of recommendations, for consideration by local health and landuse agencies, designed to protect water quality and public health in nonsewer areas. These recommendations, which assume that on-site methods will continue to be the preferred method of wastewater management in the nonsewer areas, may be summarized as follows:

- o Establish a comprehensive program for design, construction, and maintenance of on-site and community systems.

- o Identify an areawide management agency and implement a program demonstrating long-term commitment to management of nonsewer areas.



Assumptions: 1) Inflation rate of 11% annually from 1981 to 1982 and 10% annually thereafter.
2) Rates are based upon 30 year revenue bonds at 10% interest.

Given the stated assumptions, the actual monthly rate will be within the shaded band presented above. The exact amount will depend upon decisions made related to Metro's other treatment plants. Options being considered include: "full utilization" of West Point; the Preferred Facilities Plan (January, 1979); and secondary treatment at all Metro plants.

SOURCE:
METRO, 1981

FIGURE 2-3. ESTIMATED FUTURE METRO MONTHLY RATE (ASSUMING METRO RECEIVES 33% OF AVAILABLE STATEWIDE FUNDS)

- Establish on-site management zones in nonsewer areas where system performance or soil condition is poor.
- Establish a routine performance monitoring system.
- Further strengthen existing rules and regulations to emphasize proper design and construction.
- Provide adequate staffing and funding for on-site wastewater management programs, and provide adequate enforcement of rules and regulations.
- Encourage experimentation with alternative technologies.
- Establish public education program emphasizing the long-term nature of on-site systems and proper design, construction, and maintenance.

Triggering Mechanism

The triggering mechanism is a monitoring program proposed by Metro's Wastewater Management Plan to accomplish three purposes: 1) to provide advance notice for needed expansions or additions to the Metro sewerage system, 2) to monitor the performance of on-site systems in nonsewer areas, and 3) to monitor Puget Sound water quality near the outfall.

To accomplish the first purpose, monitoring of population, wastewater flow, and sewer service area changes is proposed. The triggering mechanism will act as a timing device to indicate when a decision must be made to construct an expanded or new treatment plant, pump station, or interceptor sewer. Possible courses of action include taking some nonstructural action (e.g., flow reduction, modifying facility operation), as well as structural alternatives.

Monitoring the performance of on-site systems is proposed to be the joint responsibility of local land use and health agencies, and Metro. It is assumed that local land use and health agencies will provide the necessary assessment of on-site system performance. Metro would identify existing or potential water quality problems through its lake and stream monitoring program. When a problem area is identified, appropriate local land use and health agencies would be asked to chair a meeting to verify the problem and choose an appropriate course of action. Alternative courses of action include establishing an on-site wastewater management district, developing a community wastewater system, installing a new on-site technology, connecting to the centralized sewerage system, or taking no action other than further study or evaluation.

Metro has also proposed a water quality monitoring plan for the Puget Sound outfall. Monitoring is designed to ensure that water quality standards are met and to give advance warnings if any problems develop.

Metro proposes the preparation of an Annual Wastewater Management Plan update. This update would include a status report on the Renton sewerage system and nonsewer area monitoring.

Near-Term Collection System Projects

In its Wastewater Management Plan, Metro has identified certain collection system improvements within the study area that it believes should be undertaken as soon as possible. Fourteen projects have been categorized into two groups: projects to be initiated and projects in progress. The 14 projects are listed in Table 2-5.

Approach to EIS Evaluation of Recommended Program and Alternatives

Program Elements Evaluated

Comprehensively evaluating the direct and secondary environmental impacts of long-term wastewater management alternatives for the 620-square-mile study area is a complex undertaking. The general approach taken here is to first briefly describe the study area environment (Chapter 3) and the four final long-term alternatives considered by Metro (Chapter 4). Then, separate chapters evaluate the construction and site-related impacts of components included in the four final long-term alternatives (Chapter 5); the operational impacts of these long-term alternatives (Chapter 6); and the secondary growth-related impacts are common to all alternatives (Chapter 7).

The triggering mechanism, the near-term collection system projects, and the nonsewer area alternatives proposed as parts of the Metro Wastewater Management Plan are not separately assessed for impacts in the EIS. The triggering mechanism is essentially a mitigation measure for assisting in the implementation of the long-term program, and for monitoring the performance of on-site systems in nonsewer areas; thus, there are beneficial impacts, but no adverse impacts, attributable to the triggering mechanism. Near-term collection system projects are not part of the current decisions which

Table 2-5. Near-Term Collection System Projects

Projects to be Initiated

Facility	Action
Kenmore Pump Station	Construct interim facility to alleviate capacity/reliability problems.
West Valley Interceptor	Contractual obligation to construct new interceptor.
Eastgate Trunk	Construct facilities to alleviate capacity problem.
Mill Creek Relief Sewer	Contractual obligation to construct new sewer.
Medina Pump Station	Construct facilities to alleviate capacity/reliability problems.
Riverton Pump Station	Construct facilities to alleviate capacity/reliability problems.
Wilburton Pump Station	Construct facilities to alleviate capacity/reliability problems.

Projects in Progress

Facility	Action
Issaquah Creek Interceptor	Contractual obligation to construct new interceptor.
Juanita System Upgrade	Construct facilities to alleviate capacity/reliability problems.
May Creek Interceptor	Construct new interceptor at local agency request.
Mercer Island System Realignment	Construct facilities to accommodate I-90 construction.
Sunset/Heathfield System Upgrade	Construct facilities to alleviate capacity/reliability problems.
Sweyoloken Pump Station	Construct facilities to alleviate capacity/reliability problems.
Wilburton Siphon	Construct new barrel to alleviate capacity problem.

are to be made a part of the Renton facilities plan; environmental review of these projects has or will be accomplished separately from this EIS process. Lastly, alternatives for the nonsewer area are not separately assessed here because they are not presented as grant-fundable projects by Metro at this time; however, environmental impacts of and mitigation measures for on-site systems in the nonsewer area are assessed in the secondary groundwater impacts section of the EIS.

Differences in Impacts Between Recommended Program and Alternative A-3

The recommended program, as noted previously in this chapter, defers the decision as to hookup of the West Point sewered area to the Renton plant. Therefore, an expansion of the Renton plant will be made only to 72 MGD to treat year 2000 flows. A decision to construct the Redmond and North Creek/Hollywood connections will not be made at this time. The recommended program is identical to Alternative A-3 as originally defined, except that year 2000 treatment plant capacity is 72 MGD (versus 99 MGD under Alternative A-3) and the connection sewers are not built.

If a future decision is made to continue the West Point deemphasis policy, the recommended program would lead to implementation of Alternative A-3. For this reason, the detailed evaluations in this EIS focus on Alternative A-3, rather than the recommended program, and compare the impacts of Alternative A-3 to other long-term alternatives. The analysis in the EIS is a maximum service area analysis, assuming the sewered portions of the entire study area would connect to the Renton plant.

What impacts would result if the alternative decision is made to abandon the West Point de-emphasis policy? In this case, the recommended program would become the "year 2000 program" for the Renton treatment plant. Three major changes in impacts would occur. First, the site impacts at the Renton plant would be reduced because less new construction would be needed. Second, water quality effects of Renton effluent on Puget Sound would be less because only 72 MGD would be discharged through the Renton tunnel and outfall, compared to 101 MGD under Alternative A-3; it should also be recognized, however, that the 29 MGD difference would be discharged via the West Point outfall, where it would receive only primary treatment if a waiver for the West Point plant is granted. Third, the Redmond and North Creek/Hollywood connections would not be built, avoiding the construction and site-related impacts associated with these sewers.

Deferring the decision on the status of the West Point deemphasis policy has certain institutional effects. This deferral would extend the period of public uncertainty over the locations for treatment and discharge of north study area flows. There may be some public confusion or dissatisfaction over this reconsideration of a decision which was previously reached with public participation. The deferral will place more importance on the future decision on service area configuration, since more options would be available in that decision and more people would therefore be potentially affected.

Chapter 3

DESCRIPTION OF AFFECTED ENVIRONMENT

This chapter presents an overview of the Lake Washington/ Green River Basins study area. The following topics are covered: climate and air quality; soils, geology, and groundwater; water resources and water quality; biology and fisheries; and land use and socio-economics. The intent of these sections is to acquaint readers unfamiliar with the study area with its key biophysical and socio-economic features. Existing environmental conditions are further described in the appendices to the EIS and in Metro's Technical Memo #2. In addition, site-specific environmental features (e.g., the Green/Duwamish River) are described in the background sections of the impact assessments appearing in Chapters 4 and 5.

Climate and Air Quality

Climate

The climate of the Lake Washington/Green River Basins study area is characterized by relatively cool, wet winters and warm, dry summers. The study area's close proximity to the Pacific Ocean, Puget Sound, and the Olympic and Cascade Mountains are major factors influencing the climate of the area.

Annual precipitation within the study area ranges from 35 inches in the lowlands to 100 inches or more in the surrounding mountains. Seventy-five percent of the annual precipitation occurs during the 6-month period from October through March. Only 5 percent of annual precipitation falls during July and August.

Local temperature conditions vary considerably in the study area according to elevation, solar radiation, and distance from Puget Sound. Temperatures during the summer months are generally in the 70s, with occasional temperatures in the 80s. Winter temperatures are typically in the 40s in the lowlands and decrease with increasing altitude -- approximately 3°F for every 1,000 feet of elevation.

Temperature inversions (an increase of temperature with height) have been recorded every month of the year in Seattle, but they are most common in October.

Air Quality

The concentrations of ozone, carbon monoxide (CO), sulfur dioxide, and total suspended particulates (TSP) exceed National Ambient Air Quality Standards (NAAQS) within the central Puget Sound region. Because of these violations, portions of the region have been designated nonattainment areas with respect to these pollutants. In response to the Clean Air Act Amendments of 1977, an Air Quality Management Plan (AQMP) was prepared by the Puget Sound Air Pollution Control Agency (PSAPCA) and the PSCOG (Puget Sound Air Pollution Control Agency and PSCOG, 1978). The purpose of the AQMP is to present a coordinated, regional strategy for the attainment of NAAQS.

Vehicular traffic on paved and unpaved roads accounts for the majority of TSP emissions in both Renton and Kent (Figure 3-1). Other important sources include mobile emissions (tailpipe emissions) and fuel combustion.

CO emissions in Bellevue are almost exclusively from motor vehicles (Figure 3-1). No other sources contribute significant quantities of CO emissions.

Hydrocarbon emissions contribute to the formation of ozone. Emissions from motor vehicles are the major source of hydrocarbons (55 percent) in the Puget Sound region. Other important sources include solvents, surface coating, petroleum marketing, and mobile sources other than motor vehicles (Figure 3-1).

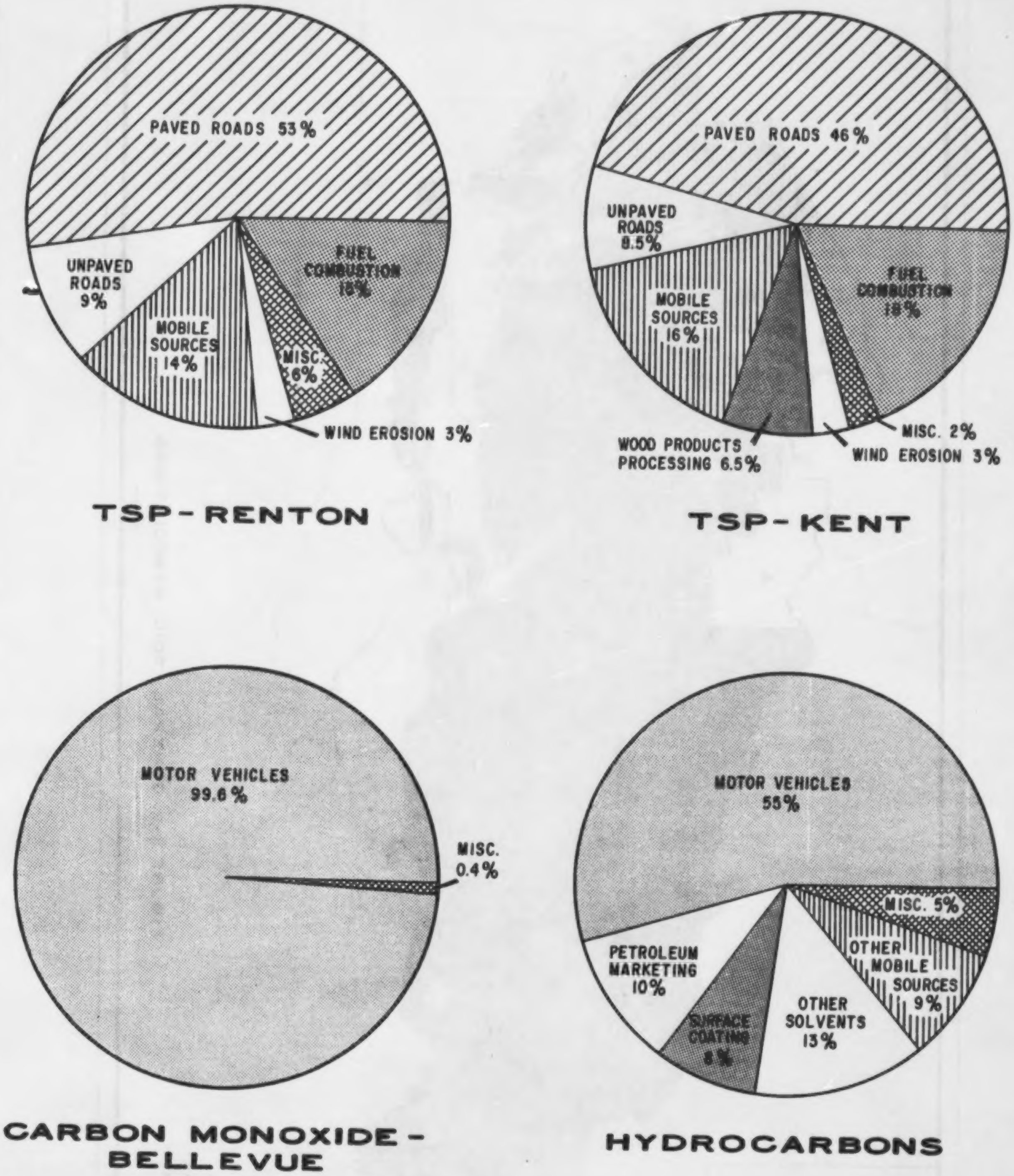
Soils, Geology, and Groundwater

Soils

A map of regional soil associations in the study area is presented in Figure 3-2. Data on generalized capability class and typical land use of each major soil series and slope class are presented in Table 3-1. The degree of soil limitation for wastewater management is also indicated for on-site septic tank drain fields, sewage lagoons, and for effluent irrigation systems.

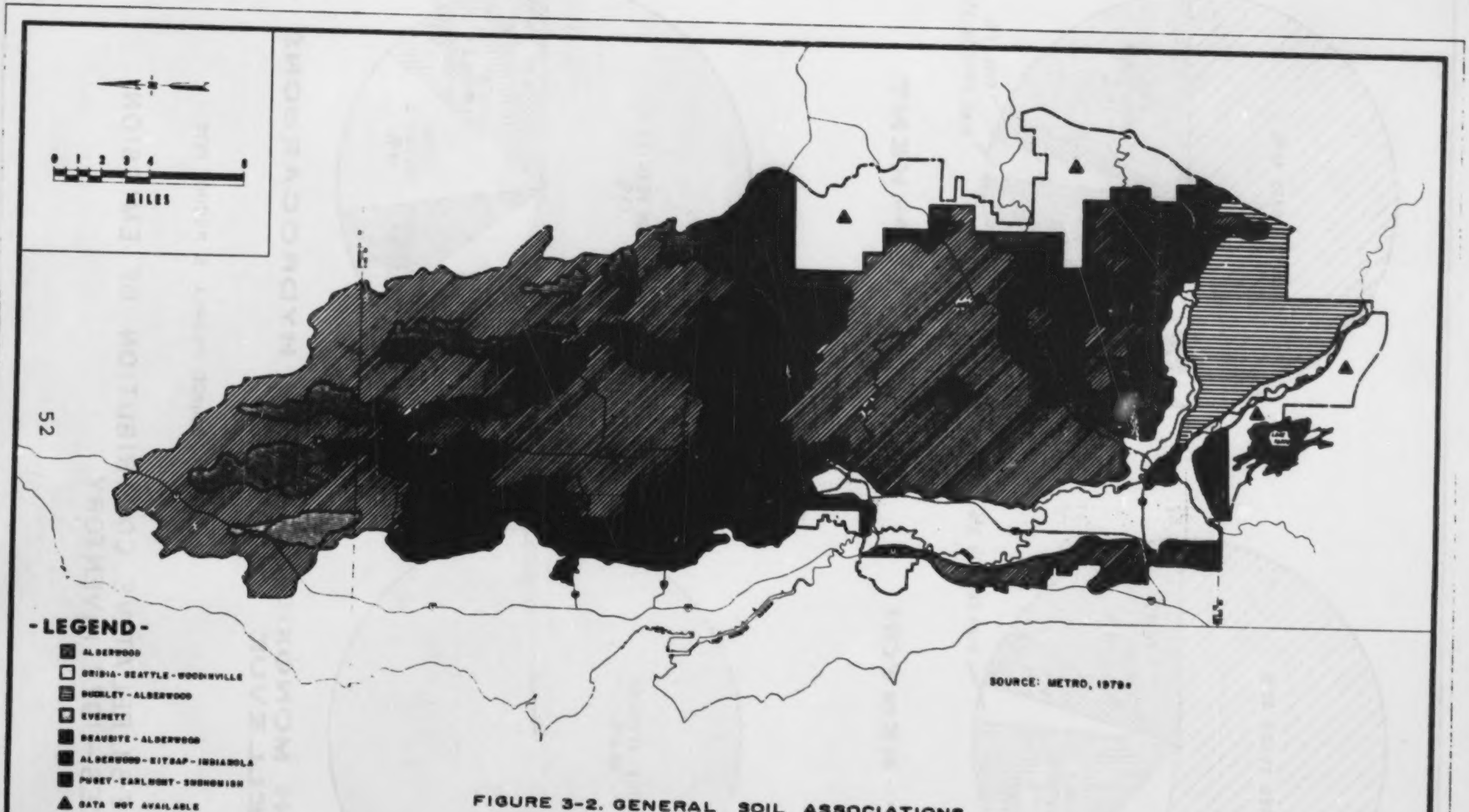
Most of the soils occurring in the study area have severe limitations for use as septic tank leach fields arising from their shallow depth, slow permeability or excessive slope. Moderate to severe soil limitations also exist for irrigation reuse of treated effluent.

Site-specific soils and geologic constraints along the proposed tunnel/outfall routes are discussed in General Response Number 7 presented in the EIS FOREWORD.



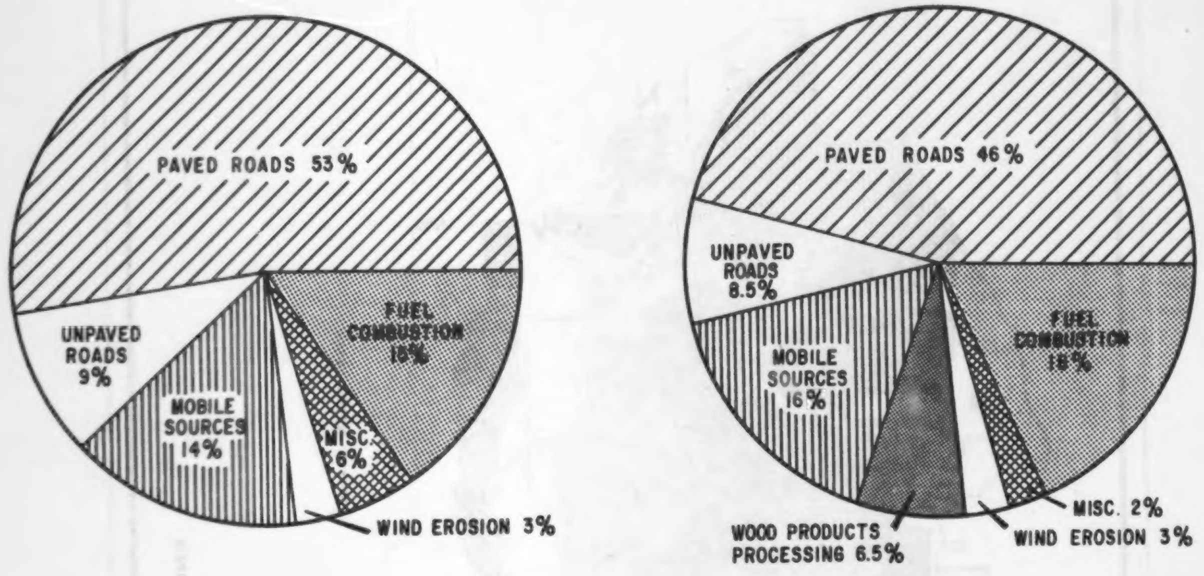
SOURCE: PSAPCA & PSCOG, 1978

FIGURE 3-1. RELATIVE CONTRIBUTION OF EMISSION SOURCES – 1977 INVENTORY



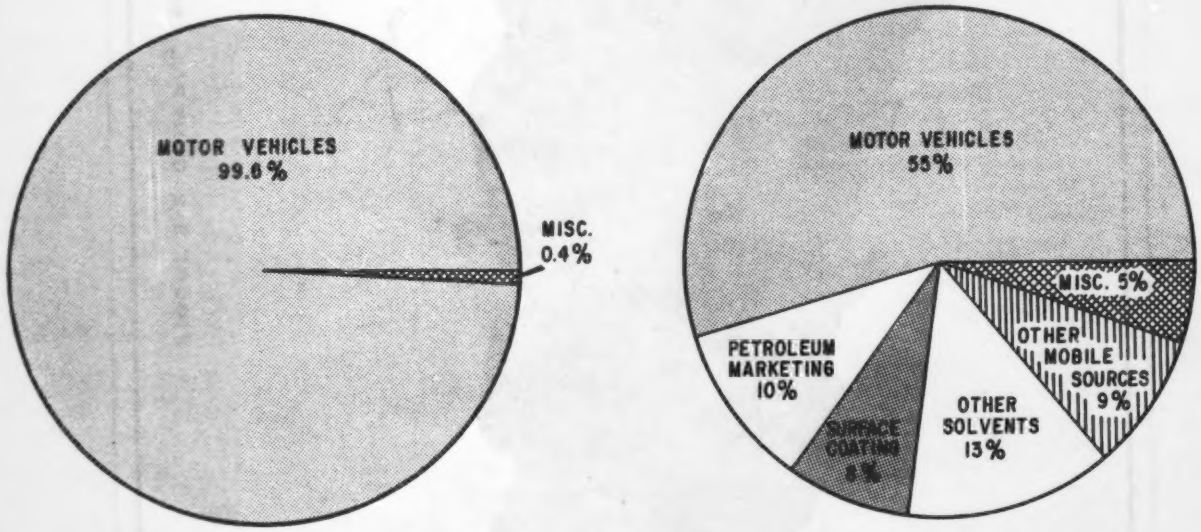
SOURCE: METRO, 1979a

FIGURE 3-2. GENERAL SOIL ASSOCIATIONS



TSP-RENTON

TSP-KENT

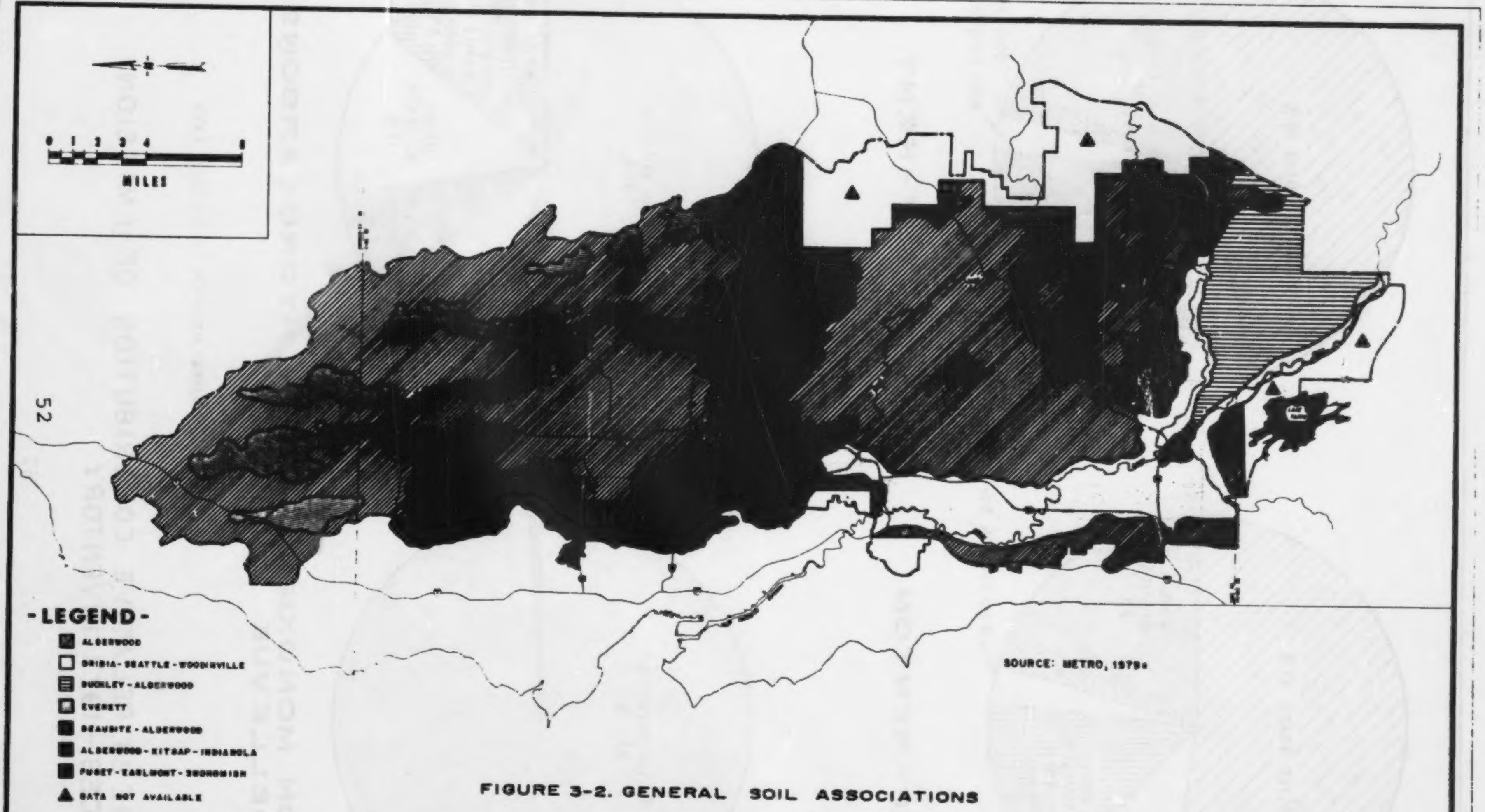


CARBON MONOXIDE - BELLEVUE

HYDROCARBONS

SOURCE: PSAPCA & PSCOG, 1978

FIGURE 3-1. RELATIVE CONTRIBUTION OF EMISSION SOURCES – 1977 INVENTORY



SOURCE: METRO, 1979a

FIGURE 3-2. GENERAL SOIL ASSOCIATIONS

Table 3-1. Use and Limitations of Some Dominant Soils in the Renton Study Area

Series	Map Symbol[a]	Slope (%)	Agricultural Capability Class	Typical Usage[b]	Limitations for Waste Disposal					
					Septic Tank Leach Fields		Sewage Lagoons		Irrigation Reuse	
					Degree of hazard	Type of hazard[c]	Degree of hazard	Type of hazard[c]	Degree of hazard	Type of hazard[c]
Alderwood	AgB	0-06	IVe	TPRU	severe	d,p-	moderate	s	moderate	d
	AgC	6-15	IVe	TPRU	severe	d,p-	severe	s	moderate	s,d
	AgD	15-30	VIe	TP	severe	d,p-	severe	s	severe	s,d
	AkF	25-70	VIIe	T	severe	s,p-	severe	s	severe	s,d
Beausite	BeC	6-15	IVe	TPU	severe	d,p-	severe	s	moderate	s,d
	BeD	15-30	VIe	TP	severe	d,p-	severe	s	severe	s,d
	BeF	40-75	VIIe	T	severe	s,p-	severe	s	severe	s,d
Buckley	Bu	< 3	IIIw	P,H	severe	w	severe	o	moderate	p-,w
Earlmont	Ea	< 1	IIw	PR	severe	f,w	severe	f,o	moderate	f,w
Everett	EvB	0-05	IVs	TPU	moderate	p+	severe	p+	moderate	p+
	EvC	5-15	VIs	TPU	moderate	p+	severe	p+	severe	p+
	EvD	15-30	VIs	T	severe	s,p+	severe	s,p+	severe	s,p+
Indianola	InA	0-04	IVs	TU	moderate	p+	severe	p+	severe	p+
	InC	4-15	IVs	T	moderate	p+	severe	p+	severe	p+,s
	InD	15-30	VIe	T	severe	s,p+	severe	s,p+	severe	s,p+
Kitsap	KpB	2-08	IIIe	TP	severe	p-	moderate	s	moderate	p-,d
	KpC	8-15	IVe	TP	severe	p-	severe	s	moderate	p-,s
	KpD	15-30	VIe	TP	severe	s,p-	severe	s	severe	s,p-
Oridia	Os	< 2	IIw	RPU	severe	f,w	severe	f	moderate	w,f
Puget	Pu	< 1	IIIw	RP	severe	p-,f,w	severe	f	moderate	w,f
Seattle	Sk	< 1	IIw	PHR	severe	w,o	severe	o	severe	o,w
Snohomish	So	< 2	IIw	RPH	severe	f,w,o	severe	f,p+,o	moderate	w,f
Woodinville	Wo	< 2	IIw	RPU	severe	w,f	severe	f,o	moderate	w,f

[a] refers to detailed soil survey map sheets

[b] T = timber
R = row crops
U = urban development
P = pasture
H = hay crops

[c] d = shallow depth
f = flooding
o = organic soil layers
p-= slow permeability
p+= excessive permeability
s = excessive slope
w = high seasonal water table

Geology and Groundwater

The stratigraphy and occurrence of groundwater in surficial deposits and water-bearing units is described in this section. The principal water-bearing units in the project area include sand and gravel of the Salmon Springs drift, advance outwash (including the Esperance sand) and recessional outwash of Vashon drift, alluvial floodplain deposits and alluvial fan deposits. Figure 3-3 depicts a schematic hydrogeologic cross section of the Lake Washington/Green River Basins.

Salmon Springs drift deposits consist of up to 200 feet of sand and gravel with lesser amounts of silt and clay. These deposits generally form confined aquifers at varying depths below the ground surface and in many places are the principal source of groundwater for municipal wells. Vashon recessional and advance outwash glacial deposits consist dominantly of sand and gravel. Vashon recessional outwash deposits occur at the ground surface, are saturated locally, and are penetrated by many small domestic wells. Advance outwash deposits occur at or near the ground surface, are saturated throughout except at the edge of drift plains where they are typically well drained, and yield small to moderate amounts of water to wells. These deposits are highly developed for both domestic and municipal water supplies.

Alluvial floodplain and alluvial fan deposits of sand and gravel occur along the rivers draining the Cascade Mountains. These deposits form shallow aquifers which are in hydrologic continuity with surface water bodies, and yield moderate amounts of water to numerous small, shallow wells.

Vashon till is very widespread in the project area. These glacial deposits, with a thickness of about 50 feet, do not constitute major water-bearing aquifers because they are dominantly composed of clay and silt and are fairly compact throughout their thickness. The top portion, however, on which the Alderwood soil series is developed, is tapped by many small domestic wells, and is generally loosely compacted and susceptible to contamination.

Available data indicate that the quality of groundwater in the study area is good to excellent, although some wells yield water with objectionable concentrations of iron and/or chloride and dissolved solids that exceed the national drinking water standards. The concentration of orthophosphate is high throughout the study area and typically highest in the deep aquifers. This is generally attributed to inherent aquifer characteristics and not to human activities.

Groundwater with objectionable levels of iron is very common in the study area; however, no areal or stratigraphic pattern has been found in the occurrence of high iron concentrations. The solubility of iron in water increases with

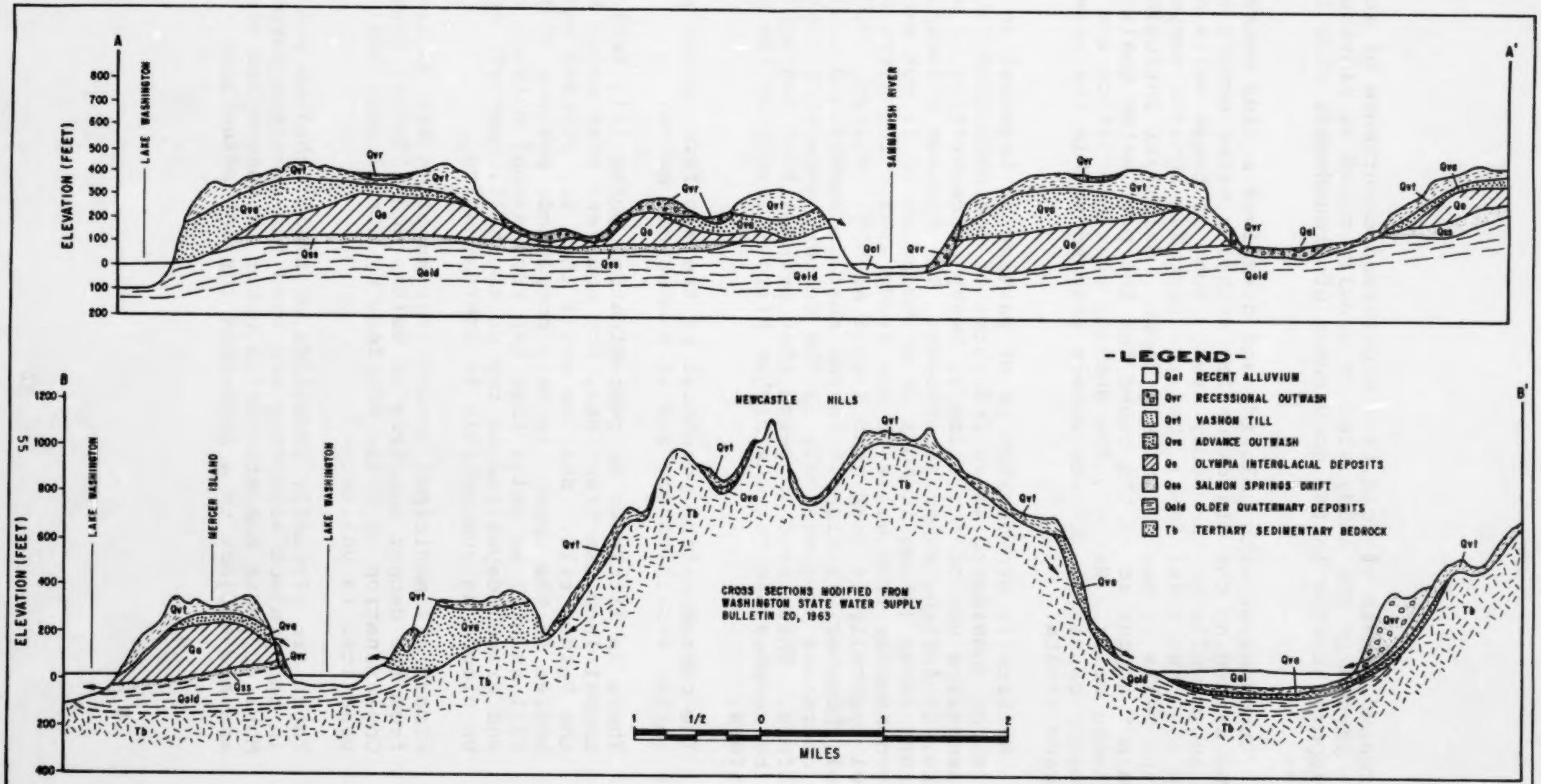


FIGURE 3-3. SCHEMATIC HYDROGEOLOGIC SECTIONS OF THE LAKE WASHINGTON / GREEN RIVER BASINS

increased levels of acidity. Widespread occurrence of acidic peat layers in the study area is usually cited as playing an important role in the occurrence of groundwater rich in iron.

Groundwater with chloride and dissolved solids concentrations exceeding the standards for drinking water occurs in two known wells in the study area. Both of these wells are deep (600 and 1,461 feet), but the specific aquifer tapped by the wells is not definitely known. Saltwater intrusion does not appear to be the cause for the poor water quality in these wells. Rather, the quality characteristics are more probably caused by connate waters trapped within the water-bearing strata.

Nitrate in groundwater is of particular interest as it can be considered as an indicator of contamination caused by excessive use of fertilizers, heavy concentration of septic tanks, or failing sewerage systems. The maximum allowable nitrate level (45 mg/l, NO_3^-) in drinking water is not exceeded in groundwater from wells in the study area. The nitrate level typically is less than 1 mg/l as NO_3^-. Nitrate (NO_3^-) level, however, is highest in the shallow unconfined aquifers and decreases progressively in the deeper, generally confined aquifers. This trend suggests that perhaps land use activities may be responsible for the higher nitrate levels in the shallow aquifers.

The contamination potential of the aquifers in the project area varies significantly and is summarized below:

1. There is little or no contamination potential, from normal land use practices, for aquifers that occur below the Vashon till. Shallow wells that tap perched water bodies in the upper, loosely compacted, portion of the till as well as wells that tap recessional outwash sand and gravel deposited on top of the till, however, must be viewed as susceptible to contamination.

2. Almost all municipal groundwater supplies are obtained from the deeper aquifers of deltas and alluvial fans. Contamination of these aquifers by normal land use practices is unlikely.

3. There are virtually thousands of small, shallow wells in the project area that are used for domestic purposes. Most of these domestic wells occur in nonsewered areas, and are subject to a high risk for contamination.

Water Resources and Water Quality

Inland Surface Water

The major surface water bodies in the study area are shown in Figure 3-4. The largest lakes are Lake Washington and Lake Sammamish. Lake Washington has a surface area of 32,000 acres and a watershed of 476 square miles, with the majority of inflow provided by the Cedar River and the Sammamish River. Lake Sammamish has a surface area of 4,900 acres and drains a watershed of about 98 square miles, with the majority of inflow provided by Tibbetts Creek and Issaquah Creek. Over 80 small lakes are dispersed throughout the study area, ranging in size from less than 5 to 150 acres.

The major rivers within the study area are the Green-Duwamish River, the Cedar River, and the Sammamish River. The Green-Duwamish River, which is about 91 miles long and drains 483 square miles, is regulated by the Howard Hanson Dam and Reservoir, with an active storage of 106,000 acre-feet; the Green-Duwamish River is primarily used for water supply, fisheries, recreation, and irrigation. The Cedar River, which is about 50 miles long and drains an area of 188 square miles, is regulated by Chester Morse Lake, with an active storage of 40,000 acre-feet; the Cedar River is primarily used for water supply, recreation and fisheries, and to prevent saltwater intrusion into Lake Washington at the Chittendon Locks. The Sammamish River is about 14 miles long and drains about 196 square miles; it is primarily used for fisheries and recreation. Numerous smaller streams within the study area provide inflow to the larger lakes and rivers, and serve as important fishery and recreational resources.

The quality of study area surface waters is generally good. Metro has rated lakes, rivers, and streams for beneficial uses based on its ongoing water quality monitoring programs. Table 3-2 presents a summary of Metro's lake use ratings, and Table 3-3 presents a summary of Metro's river and small streams use ratings.

Water quality of the Green-Duwamish River is of special importance for this EIS because it is the present discharge location for Renton treatment plant effluent, and because some long-term alternatives for the Renton plant involve continued river discharge. Details regarding water quality within the Green-Duwamish River are presented in Chapter 5 of the EIS.

Puget Sound

Puget Sound is a semienclosed water body where sea water from the open ocean mixes with fresh waters from rivers and lakes draining the sound. The sound consists of a series of interconnecting deep basins separated by relatively shallow sills.

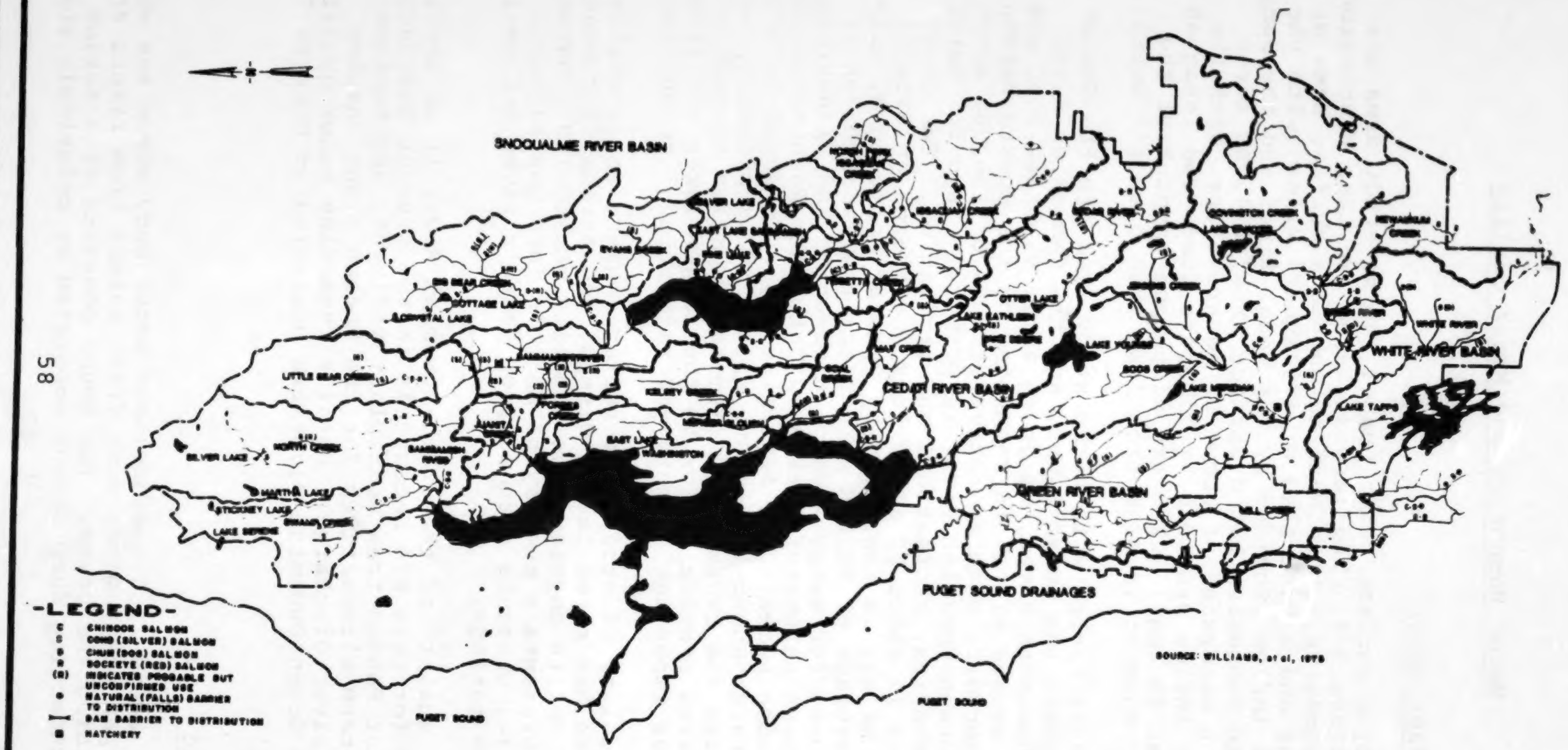


FIGURE 3-4. MAJOR SURFACE WATER BODIES IN THE STUDY AREA SHOWING SALMON USE

Table 3-2. Lake Use Ratings

Lake	Aesthetics	Fishability: Trout Habitat	Fishability: Spiny Ray Habitat	Swimmability
Large Lakes				
Sammamish	Fair	Good	Good	Good
Washington	Good	Good	Good	Good
Small Lakes				
Bass	Fair	Insufficient Data		Fair
Beaver	Good	Good	Good	Fair
Cottage	Poor	Fair	Fair	Fair
Deep	Good	Good	Good	Good
Desire	Poor	Fair	Fair	Poor
Dolloff	Poor	Insufficient Data		Poor
Kathleen	Fair	Fair	Fair	Fair
Lucerne	Good	Insufficient Data		Good
Meridian	Good	Fair	Good	Good
Moneysmith	Poor	Insufficient Data		Poor
Morton	Fair	--	Fair	Fair
Number Twelve	Fair	Good	Good	Fair
Panther	Poor	Insufficient Data		Poor
Phantom	Fair	Insufficient Data		Insufficient Data
Pine	Fair	Good	Good	Poor
Pipe	Good	Fair	Good	Good
Retreat	Good	Fair	Good	Good
Sawyer	Fair	Good	Good	Fair
Shadow	Good	Good	Good	Fair
Shady	Fair	Fair	Good	Fair
Spring/Otter	Fair	Fair	Fair	Good
Wilderness	Fair	Fair	Fair	Good

SOURCE: Metro, 1979e.

Table 3-1. River and Small Stream Use Ratings

River/Stream Station		Fishability Rating	Swimmability Rating
Rivers			
Upper Green	B319	Good	Excellent
	A319	Good	Good
Lower Green	315	Excellent	Poor
	311	Fair	Poor
	3106	Fair	Poor
Duwamish	309	Fair	Fair
	307	Fair	Poor
	305	Good	Poor
Cedar	H438	Good	Excellent
	A438	Good	Good
	O438	Good	Fair
Sammamish	O486	Excellent	Good
	O480	Excellent	Fair
	O450	Excellent	Poor
Small Streams			
Mill Creek	A315	Poor	Poor
	E315	Poor	Poor
Spring Brook	O317	Poor	Poor
	E317	Poor	Poor
	H317	Poor	Poor
McAleer Creek	A432	Poor	Poor
	E432	Fair	Good
Fairweather Creek	A499	Fair	Excellent
Tibbetts Creek	A630	Fair	Fair
	B630	Poor	Poor
	U630	Fair	Excellent
Issaquah Creek	O631	Excellent	Fair
	A631	Good	Fair
North Fork	A632	Fair	Good
East Fork	O633	Fair	Good
Mason Creek	O634	Good	Poor
Holder Creek	A640	Excellent	Good
Carey Creek	A650	Good	Excellent
15-Mile Creek	A660	Fair	Excellent
Soos Creek	O320	Fair	Good
	F320	Fair	Good
Covington Creek	C320	Fair	Excellent
Jenkins Creek	D370	Good	Excellent
Little Soos Creek	G320	Fair	Poor
West Branch	B320	Fair	Fair
Swamp Creek	O470	Fair	Fair
	B470	Good	Fair
North Creek	O474	Good	Poor
	D474	Good	Fair
Little Bear Creek	O478	Fair	Fair
	B478	Fair	Poor
Bear-Evans Creek	O484	Fair	Poor
	B484	Good	Fair
	C484	Fair	Poor
	G484	Good	Poor
	J484	Fair	Fair
	N484	Fair	Fair
Coal Creek (Green River)	C325	Good	Excellent
Longfellow Creek	C370	Fair	Fair
Coal Creek (Lake Washington)	O442	Fair	Good
	C442	Fair	Excellent
	U442	Poor	Excellent
Juanita Creek	O446	Fair	Poor
	C446	Good	Poor
	D446	Excellent	Good
Thornton Creek	O434	Poor	Poor
	K434	Fair	Poor
	T434	Fair	Excellent
Forbes Creek	O456	Poor	Poor
	C456	Fair	Poor
Yarrow Bay	O498	Fair	Poor
Lyon Creek	O430	Poor	Fair
	G430	Fair	Poor
Newaukum Creek	O322	Good	Poor
	F322	Excellent	Poor
	T322	Good	Excellent
Deep Creek	F723	Fair	Excellent
May Creek	O440	Fair	Good
	K440	Fair	Fair
	X440	Fair	Fair
Kelsey Creek	O444	Fair	Poor
	D444	Poor	Fair
Crisp Creek	O321	Good	Excellent

SOURCE: Summarized from Metro (1980f).

Four outfall locations are being considered in Metro's Wastewater Management Planning for the study area: Richmond Beach, Elliott Bay, Alki Point, and Point Pulley. All four potential discharge locations are located in Puget Sound's central basin, which averages about 660 feet in depth. Details regarding water circulation at the four potential discharge locations are presented in Chapter 5 of the EIS.

Biology

Terrestrial Biology

Figure 3-5 illustrates the main wildlife habitat types of the study area. The great majority of nonurban and nonagricultural lands, located in the eastern part of the study area, are in evergreen, deciduous, or mixed forest. Wetland habitats are widely dispersed throughout the study area.

Aquatic and Marine Biology

The study area is rich in freshwater aquatic habitats. The numerous lakes and streams host a wide variety of freshwater and anadromous fishes, many of which are of commercial or recreational importance. Salmon use of study area lakes and streams is shown in Figure 3-4.

Within Puget Sound, three main habitat types can be differentiated: intertidal (between the higher high and the lower low tide lines), subtidal (bottom habitat below the low tide lines), and pelagic (open water regions above the sound's bottom). Each of these habitat types supports representative biota.

Fisheries

The fishery resources of Puget Sound and the Lake Washington/ Green River Basins are important economically, recreationally, culturally, and scientifically. The anadromous salmonids occurring in the study area include all five species of Pacific salmon (chinook, coho, red, chum, pink), searun rainbow (steelhead) trout, cutthroat trout, and Dolly Varden char. These species are found in Puget Sound, and, with the exception of pink salmon, spawn in study area streams. Pacific salmon are fished for both commercial and sport purposes, whereas the main use of anadromous trout and char is sportfishing only.

The fish resources of the Green/Duwamish River system are of particular importance for this EIS. Chinook, coho and steelhead runs of the Green River system are among the largest in the Puget Sound region. Most of the steelhead and coho are of hatchery origin, whereas the chinook run is the second

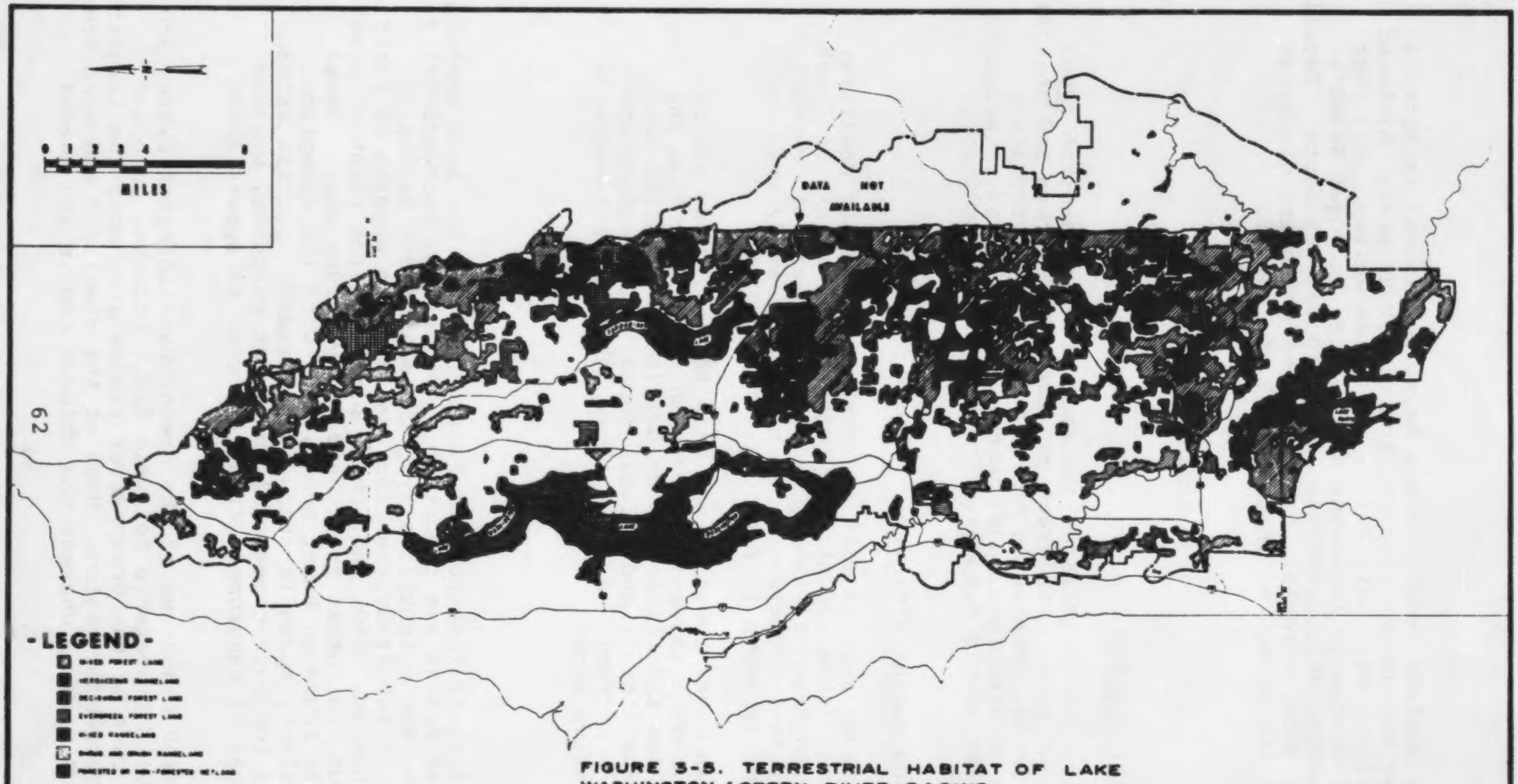


FIGURE 3-5. TERRESTRIAL HABITAT OF LAKE WASHINGTON / GREEN RIVER BASINS

largest native run in Puget Sound, even though significant numbers of chinook are also of hatchery origin. Other less prevalent anadromous fish found in the Green River system include cutthroat trout, Dolly Varden char, chum salmon and pink salmon. The Muckleshoot Indian tribe propagates a relatively small hatchery run of chum salmon (U.S. Fish and Wildlife Service 1980).

The State Department of Fisheries has estimated the annual value of the approximately 220,000 salmon provided by the Green River system to sport and commercial fisheries to be about $4 million dollars. The net economic value of the Green River steelhead fishery is estimated to be about $7.5 million per year (see Appendix C).

Within Puget Sound, marine species as well as anadromous species, are important for commercial and sportfishing. English sole and hake are the main commercial species, and Pacific cod and copper rockfish are the main recreational species. Shellfish are also important recreational and commercial species found in Puget Sound.

Species and Habitats of Special Interest

Preservation of wetland habitats is of special concern due to the wide diversity of fauna supported by wetlands, and because they serve as sediment and nutrient traps. Wetland habitats within the study area are shown in Figure 3-5.

No plant or animal species that are permanent or regular inhabitants of the study area have been listed by the U. S. Fish and Wildlife Service as "threatened" or endangered. Listed species that are occasional visitors to the study area include the gray whale (Eschrichtius robustus), the peregrine falcon (Falco peregrinus), and the bald eagle (Haliaeetus leucocephalus). EPA has determined that Metro's recommended plan will have no effect on any listed threatened or endangered species. Species and habitats of special concern within the study area, as identified by the Washington Department of Game, are listed in Appendix C of the EIS.

Land Use and Socio-Economics

Land Use

The Lake Washington/Green River Basins study area covers approximately 620 square miles of plateaus, river valleys, and foothills of the Puget Lowlands. Existing urban land uses are concentrated in the western part of the study area, with major urban concentrations along the eastern shore of Lake Washington and in the Lower Green River Valley. Urban land uses as of 1975 are shown in Figure 3-6.

Land use planning is the responsibility of the counties and the cities within the study area, with planning coordination provided by PSCOG. Of particular importance in determining future land use policy within the study area are King

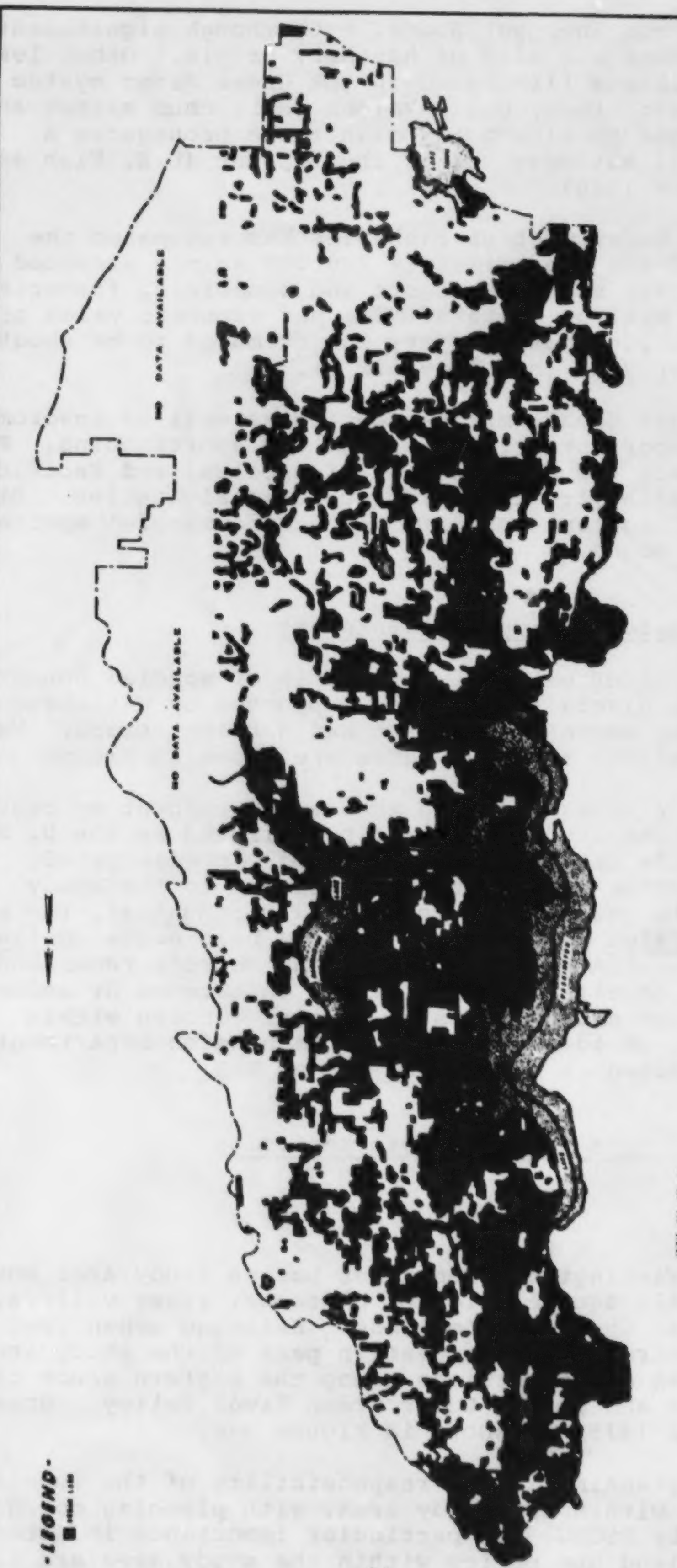


FIGURE 3-6. URBAN LAND USES IN THE LAKE WASHINGTON/GREEN RIVER BASINS, 1975

County's draft General Development Guide and the communities plans prepared by both King and Snohomish Counties for subcounty planning areas.

Population and Housing

Historic population trends from 1930 to 1970 in King and Snohomish Counties, and in major cities within the study area, are shown in Table 3-4. Economic activity during World War II provided the impetus for initial rapid population growth in the Seattle region which, with periodic fluctuations, has continued until today.

An estimated 202,680 households are located within the study area, assuming an average household size of 2.65 persons. Most multifamily dwelling units in the study area are located within the incorporated cities. The vacancy rate in the study area region in 1976 was 5.0 percent, according to census bureau data; the 5 percent figure is considered to characterize a tight housing market.

Regional Economy and Employment

The Seattle region as a whole found its early economic strengths in processing and shipping of lumber, fishing, mining and agricultural products. By the early 20th century the manufacturing and trade base of the economy was well-established.

The region enjoyed substantial growth with the coming of the aerospace industry in the 1940s when nonresource-based manufacturing outpaced the traditional regional industries. In the 1970s the region has further developed into a service-based economy with major growth in finance, insurance, real estate, trade, tourism, and other service industries.

The City of Seattle still contains the major concentrations of manufacturing jobs in the region, although certain of the outlying communities (particularly Renton, Bellevue, Kirkland and Redmond) have attracted production units and corporate offices of major manufacturers over the years.

Manufacturing employment is fairly highly concentrated: three firms (Boeing, Weyerhaeuser and PACCAR) employ half of the county's manufacturing labor force. This concentration has contributed to the pattern of boom and bust in the regional economy over time. The diversification of the regional economy - a trend of the 1960s that has continued through the 1970s - has strengthened the region's ability to withstand downturns in any one of its major industries.

Table 3-4. Historic Population Trends, Counties and Major Cities, 1930-1970

Year	1930	1940		1950		1960		1970	
Place	Population	Population	Percent Change	Population	Percent Change	Population	Percent Change	Population	Percent Change
King County	463,517	504,980	9	732,992	45	935,014	28	1,156,633	24
Snohomish County	78,861	88,754	13	11,580	26	172,199	54	265,236	54
Seattle	365,583	368,302	1	467,591	27	557,087	19	530,831	-5
Bellevue						12,809	--	61,102	377
Mercer Island								19,047	--
Renton	4,062	4,488	10	16,039	257	18,453	15	25,258	37
Auburn	3,906	4,211	8	6,497	54	11,933	84	21,817	83
Kent	2,320	2,586	11	3,278	27	9,017	175	21,510	139
Kirkland	1,714	2,084	22	4,713	126	6,025	28	15,249	153
Redmond	460	530	15	573	8	1,426	149	11,031	674
Edmonds	1,165	1,288	11	2,057	60	8,016	290	23,998	199
Everett	30,567	30,224	-1	33,849	12	40,304	19	53,622	33
Tacoma	106,817	109,408	2	143,673	31	147,979	3	154,581	4

DATA FROM: U. S. Department of Commerce, Bureau of the Census.

SOURCE: Metro, 1979e.

Public Services Provision

Public services within the study area are provided by the counties, cities, and numerous special districts. The counties are generally responsible for county roads, criminal justice, health services, and county parks. Cities are generally responsible for providing general government, water and sewer service, police and fire protection, parks, and libraries within their corporate limits; in unincorporated areas these services are the responsibility of either special districts (for fire protection, water and sewer) or the county. Educational services are provided by special districts in both incorporated and unincorporated areas.

Chapter 4

DESCRIPTION OF ALTERNATIVES

Introduction

This chapter describes long-term wastewater management alternatives for the sewer service area, and solids disposal alternative and costs. A detailed description of Alternatives A-3 and A-5 is provided, since Alternative A-3 is one possible consequence of implementing the recommended program described in Chapter 2 of the EIS.

Long-Term Alternatives for Sewer Service Area

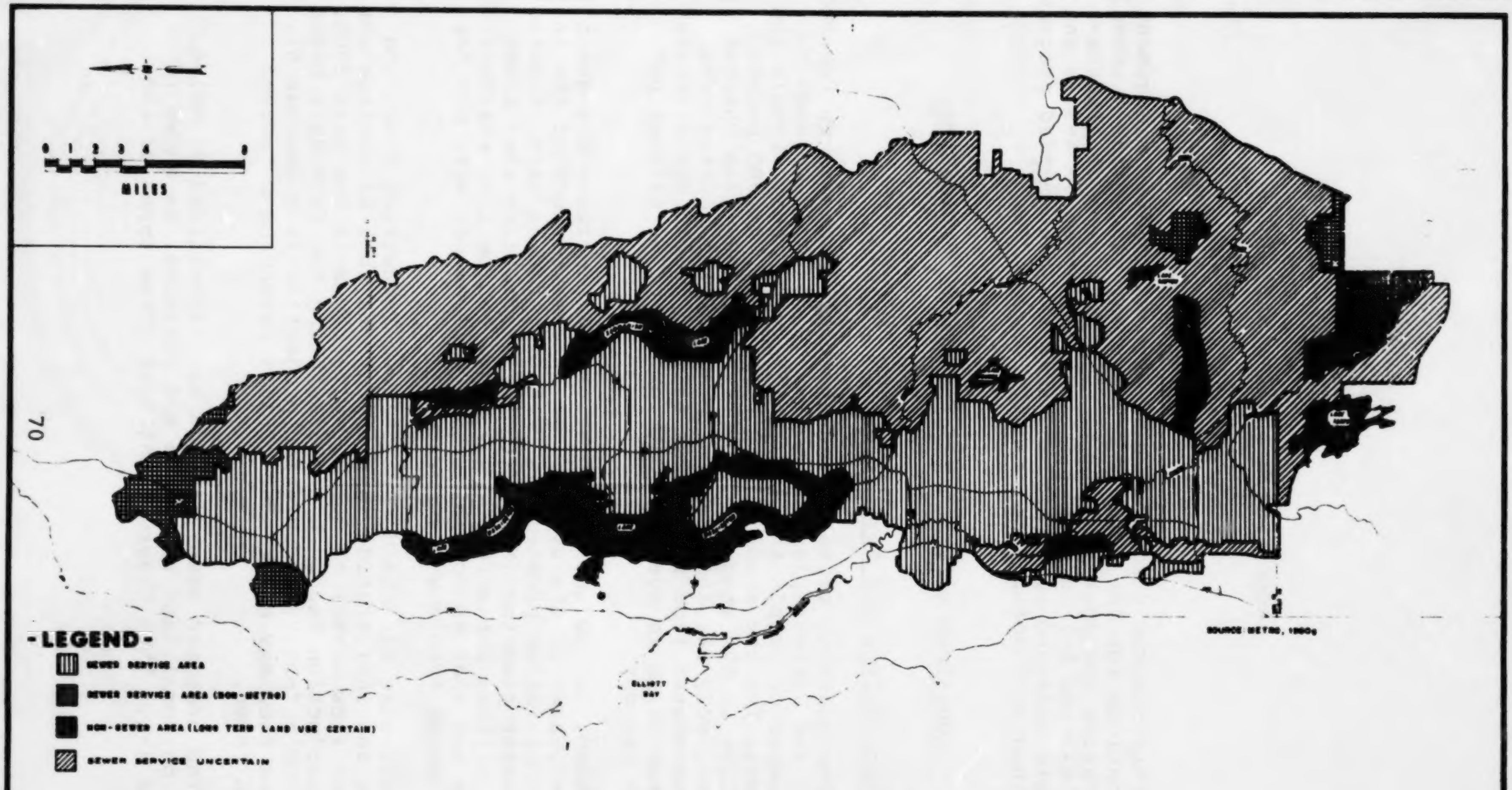
Flow Projections and Service Area

The quantity of wastewater that will need to be treated during the 20-year planning period is directly related to the number of people in the sewer service area. Population forecasts for the study area project that 805,000 people will live in the study area by the year 2000 (see Chapter 6). However, only 681,000 are projected for the sewered area. The wastewater flow from these 681,000 people was estimated by Metro using an average contribution of 80 gallons per capita per day.

Also, inflow and infiltration will increase the quantity of wastewater in the system. An extensive study of the inflow and infiltration problem has been prepared as part of Metro's wastewater planning (Metro, 1980d), indicating that about 1,200 gallons per acre per day would inflow into existing sewers and that approximately 500 gallons per acre per day would enter from new sewers.

Allowing for the domestic flow, industrial flow, and inflow and infiltration, Metro projects that an average wet weather flow (AWWF) of 101 MGD will occur in the year 2000. This projection has been prepared using the forecasts based on PSCOG's "policy" population projection (see Chapter 6), and the flow may be greater or less depending on actual growth rates.

The proposed sewer service area identified by Metro, based on local land use plans and policies, is shown in Figure 4-1. This figure identifies three types of land



SOURCE: METRO, 1980g

FIGURE 4-1. SERVICE AREAS

within the study area: sewer service area (lands presently authorized for sewer service by local agencies), nonsewer area/long-term land use certain (lands which local policies indicate should not be provided with sewer service), and sewer service uncertain (lands where there is no clear local policy guidance, treated as nonsewer lands for purposes of wastewater management planning). The consistency of the proposed service area with local land use plans and policies is analyzed in Chapter 6 of this EIS.

Description of 15 Initial Alternatives

In its preliminary plan, Metro (1980e) presented 15 long-term alternatives for study area wastewater management. The 15 alternatives were variations of three basic concepts: (a) expansion of the Renton treatment plant to process all wastewater generated in the sewer service area (example program A), (b) expansion of the Renton plant and construction of a plant in the Kenmore area (example program B), and (c) construction of six satellite plants in addition to Renton plant expansion and new Kenmore plant construction (example program C). The 15 initial alternatives are summarized in Table 4-1.

Other Long-Term Alternatives for the Sewer Service Area

Alternatives Considered and Rejected by Metro.

Other alternatives for meeting the long-term needs of wastewater management were considered and rejected by Metro early in the planning process. These include large-scale decentralized facilities, land application of Renton and Kenmore effluent, wasteload reductions, in-river actions, and alternative treatment plant layouts. These alternatives were considered by Metro to be incapable of meeting all the needs of a long-term project. The following discussion presents a summary of each of those alternatives.

Large-Scale Decentralized Facilities. Other possible sites for large plants considered in addition to Renton and Kenmore could be North Lake Sammamish or the Soos Creek Plateau. Additional plants could treat wastewater generated in those areas and discharge either to nearby bodies of water or to land.

These plants were not pursued because of high costs. Advanced wastewater treatment (AWT) would be required for a discharge to water, and land acquisition would be required for land application; both of these requirements are costly. Also, Metro determined that the risk of pollution of Lake

Table 4-1. Description of 15 Initial Long-Term Alternatives

Alternative	Configuration of Treatment Plants	Receiving Water	Level of Treatment	Total Cost (present worth, millions)
A-1	**CENTRALIZED** - The entire sewer service area would be served by an expanded treatment plant at Renton. Flows from the North Lake Washington and North Lake Sammamish basins which now flow to West Point would be diverted to Renton via the Redmond connection and North Creek/Hollywood interceptor.	All treated effluent would continue to be discharged to the Green/Duwamish River.	The level of treatment would be increased to "advanced secondary" with nitrification.	$267
A-2		All treated effluent would continue to be discharged to the Green/Duwamish River.	The level of treatment would be increased to "advanced wastewater treatment" with nutrient removal.	$428
A-3		All treated effluent would be diverted via force mains and a tunnel to the Three Tree Point vicinity for discharge to Puget Sound.	The level of treatment would be relaxed to "conventional secondary" (to a 30/30 level, i.e., 30 mg/l BOD and 30 mg/l SS).	$279
A-4		All treated effluent would be diverted via a gravity sewer to Elliott Bay for discharge to Puget Sound.	The level of treatment would be relaxed to "conventional secondary" (to a 30/30 level).	$319
A-5		All treated effluent would be diverted via a gravity sewer and tunnel to Alki Point for discharge to Puget Sound.	The level of treatment would be relaxed to "conventional secondary" (to a 30/30 level).	$345

Table 4-1 (cont.)

Alternative	Configuration of Treatment Plants	Receiving Water	Level of Treatment	Total Cost (present worth, millions)
B-1	DUAL CENTERS - 75 percent of the sewer service area would be served by an expanded treatment plant at Renton. The remaining 25 percent would be served by a new treatment plant in the Kenmore area. The new Kenmore plant would treat wastewater from that portion of the study area which now flows to West Point.	Renton effluent would continue to be discharged to the Green/Duwamish River. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound.	At Renton the level of treatment would be increased to "advanced secondary" with nitrification. At Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level).	$329
B-2		Renton effluent would continue to be discharged to the Green/Duwamish River. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound.	At Renton the level of treatment would be increased to "advanced wastewater treatment" with nutrient removal. At Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level).	$469
B-3		Renton effluent would be diverted via force mains and a tunnel to the Three Tree Point vicinity for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound.	At both Renton and Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level).	$345
B-4		Renton effluent would be diverted via a gravity sewer to Elliott Bay for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound.	At both Renton and Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level).	$397
B-5		Renton effluent would be diverted via a gravity sewer and tunnel to Alki Point for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound.	At both Renton and Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level).	$423

Table 4-1 (cont.)

Alternative	Configuration of Treatment Plant	Receiving Water	Level of Treatment	Total Cost (present worth, millions)
C-1	DECENTRALIZED - The sewer service area would be served by two major treatment plants at Renton and Kenmore (see "Dual Centers" configuration) with six small decentralized facilities to serve isolated sewered areas not contiguous to the major sewer service area. These small decentralized plants would be located in Sunrise, Sahalee, Pine Lake, Lake Desire, Pipe Lake and Timberlane and would serve approximately 2 percent of the sewer service area.	Renton effluent would continue to be discharged to the Green/Duwamish River. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound. Effluent from the six decentralized plants would be stored during the wet season and used for "nonfood" crop irrigation during summer months on lands owned (or controlled) by Metro.	At Renton the level of treatment would be increased to "advanced secondary" with nitrification. At Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level). At the six decentralized plants the level of treatment would be "conventional secondary".	$359
C-2		Renton effluent would continue to be discharged to the Green/Duwamish River. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound. Effluent from the six decentralized plants would be stored during the wet season and used for "nonfood" crop irrigation during summer months on lands owned (or controlled) by Metro.	At Renton the level of treatment would be increased to "advanced wastewater treatment" with nutrient removal. At Kenmore the level of treatment would be "conventional secondary" (to a 30/30 level). At the six decentralized plants the level of treatment would be "conventional secondary".	$499
C-3		Renton effluent would be diverted via force mains and a tunnel to the Three Tree Point vicinity for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound. Effluent from the 6 decentralized plants would be stored during the wet season and used for "nonfood" crop irrigation during summer months on lands owned (or controlled) by Metro.	At Renton, Kenmore and the six decentralized plants the level of treatment would be "conventional secondary" (to a 30/30 level).	$386
C-4		Renton effluent would be diverted via a gravity sewer to Elliott Bay for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound. Effluent from the six decentralized plants would be stored during the wet season and used for "nonfood" crop irrigation during summer months on land owned (or controlled) by Metro.	At Renton, Kenmore and the six decentralized plants the level of treatment would be "conventional secondary" (to a 30/30 level).	$426

Table 4-1 (cont.)

Alternative	Configuration of Treatment Plants	Receiving Water	Level of Treatment	Total Cost (present worth, millions)
C-5		Renton effluent would be diverted via a gravity sewer and tunnel to Alki Point for discharge to Puget Sound. Kenmore effluent would be diverted via a tunnel to Richmond Beach for discharge to Puget Sound. Effluent from the six decentralized plants would be stored during the wet season and used for "nonfood" crop irrigation during summer months on lands owned (or controlled) by Metro.	At Renton, Kenmore and the six decentralized plants the level of treatment would be "conventional secondary" (to a 30/30 level).	$453

SOURCE: Metro, 1980g.

Sammamish was too great from a nutrient contamination standpoint. Overall, it was determined that the transportation of those wastes to other areas is more cost-effective than local treatment and disposal.

Large-Scale Land Application. Metro's facilities plan consultant has prepared a detailed assessment of land treatment alternatives for Renton effluent (Brown and Caldwell, 1981). This assessment considers slow rate and rapid infiltration land treatment of Renton effluent. Winter storage of effluent would be required under slow rate application, but not under rapid infiltration.

It is estimated that for slow rate application, about 12,600 acres of land would be needed to treat a year 2000 average wet weather flow (AWWF) of 72 MGD, and that 16,000 acres would be needed to treat a year 2000 AWWF of 99 MGD. Rapid infiltration, by comparison, could be accomplished with about 1,200 acres of land for infiltration ponds and a buffer zone, assuming a year 2000 AWWF of 99 MGD.

Costs of the land application alternatives are considerably higher than transfer of Renton effluent to Puget Sound under Alternative A-3. The cost of slow rate land application is estimated to be $2,860 per million gallons (MG), and the cost of rapid infiltration is estimated to be $1,130 per MG; this compares to a cost of $570 per MG for Alternative A-3. Other disadvantages of land application alternatives noted by Brown and Caldwell are that they would provide capacity only to the year 2000, whereas the Renton tunnel/outfall would have capacity to serve approximately year 2030 flows; that sufficient quantities of suitable land may not be available; and that concerns exist regarding groundwater contamination and public resistance.

Wasteload and Flow Reductions. Wasteloads and flows to the Renton plant could be reduced by controlling infiltration/inflow (I/I) or reducing domestic or commercial/industrial inflows. This would reduce total wastewater flows, though pollutant loadings would remain the same. I/I offers the greatest potential for reduction of total flow in the Renton tributary system. For both the Renton and West Point systems, as much as 36 percent of the annual flow is due to I/I (Metro, 1980d). Although a potential of 29.5 MGD could be eliminated through correction of I/I problems, analysis by Metro showed that the cost of treating this flow is less than the cost of correcting I/I problems.

Potential treatment plant flow reduction measures identified by Metro are shown in Table 4-2. Reduction of other flows by retrofitting homes with watersaving features and appliances, and requiring them in all new construction, could achieve

Table 4-2. Potential Treatment Plant Flow Reduction Measures

Flow reduction measures	Action required	Responsible agency[a]	Wastewater reduction, percent	
			Within category	Total flow
1. Domestic watersaving devices				
a. Existing homes	Public education, increase water costs	Water purveyor	16	6[b]
b. New homes	Change building codes	City, counties	39	6[b]
Rate structure	Increase water use costs over base rate	Water purveyor	minimal	minimal
Public education program	Purveyor action	Water purveyor	minimal	minimal
2. Industrial pretreatment	Implement pretreatment program	Metro	Reduction will be in pollutant load, not flow	

[a] List of water purveyors follows in Table D2-3.

[b] Percentage of total flow reduction, year 2000
Year 1980: existing--8 percent, new homes--0 percent
Year 1990: existing--6 percent, new homes--4 percent
Year 2000: existing--6 percent, new homes--6 percent
Assumes approximately 40 percent of existing non-sewer homes will be sewered by 2000.

SOURCE: Metro, 1980h.

a 12 percent reduction in flow by the year 2000. Also, industrial wasteloads to the plant could be reduced; control of heavy metals from industrial sources is being studied by Metro in its toxicant pretreatment planning study.

Satellite Pretreatment. This is similar to Alternative C except that the effluent would be discharged to the Metro system. Metro analysis of this alternative indicates that the benefits do not appear to justify the cost.

In-River Actions. In-river actions were considered to reduce impacts of the Renton plant effluent. The alternatives considered were: (1) wet season retention at Howard Hansom Dam and dry season release, (2) in-river aeration, (3) chemical treatment, and (4) bank shading. These alternatives are considered by Metro to either be unrealistic (in the case of wet season retention) or ineffective as a long-term solution.

Alternative Treatment Plant Layouts. Several other possible layouts were considered by Metro but were not accepted for unspecified engineering and operational reasons.

Wastewater Reuse Alternatives. A portion of the Renton plant effluent could be reused for a variety of purposes, such as crop irrigation, landscape or golf course irrigation, industrial process water, industrial cooling water, or groundwater recharge. Wastewater reuse can reduce effluent wasteloads to receiving waters, at the same time augmenting existing freshwater supplies. In other more water-short parts of the country, wastewater reuse projects are being successfully implemented, and are encouraged by the higher level of EPA funding for innovative/alternative projects.

It has been pointed out by Metro (1980h) that demand for alternative sources of water in the Seattle area appears to be low. As growth in population and water demand continue, however, the market for reclaimed wastewater could improve. In fact, as discussed in Chapter 6, an additional source of water supply will be needed for the Seattle region in the not too distant future (Seattle Water Department, 1980). Development of this source will increase the future costs of freshwater supplies, making reclaimed wastewater more economically viable than at present.

The No-Project Alternative. EPA procedures for implementing NEPA require that the impacts of a no-project alternative be examined in EISs. Under a no-project alternative, no new facilities would be constructed. Treatment capacity at the Renton plant would not be expanded. Discharge of the Renton plant effluent would continue to the Duwamish River. Solids would continue to be pumped to the West Point plant.

Under the no-project alternative, population growth within the study area would still be likely to continue, creating problems for Metro's wastewater facilities. The pump stations that are not already overloaded would be eventually inundated by excess flow, with resultant overflow of the pump stations or backup in the interceptors until they overflow. The flow that did reach the plant would increasingly exceed the plant's capacity to completely treat it. Use of chemicals would increase in an effort to compensate for the high flows. But, over the long term, flow would increase until any "nonstructural" method of increasing the plant's treatment capability would be exceeded. Consequently, partially treated effluent would be discharged to the river, and Metro would be in violation of its discharge permit. Continued permit violations could result in daily fines or a sewer moratorium within the Renton plant service area.

If none of the facilities discussed in the facilities plan is constructed, current users would continue to pay the monthly charge of $4.50; this cost would be likely to escalate over time as Metro's O&M costs escalate. The biggest "cost" of a no-project alternative is the unquantifiable environmental cost which would result from decreased water quality in the Green/Duwamish River.

A second type of no-project alternative would be no action as to EPA funding of Metro's recommended program. If no grant funds were provided, the recommended program would become less financially feasible, but some action would probably be taken, resulting in higher local costs.

Description of Screening/Selection Process and Final Alternatives

The Selection Process

Metro's selection of alternatives for final consideration was accomplished by a three-stage screening procedure. The first stage in the selection process compared the attributes of each alternative to baseline criteria. The baseline criteria were water quality, cost and land use. The water quality standards consisted of Department of Ecology (DOE) receiving water standards (the Duwamish River is a Class A stream at the point of discharge); the DOE "nondegradation policy"; and the DOE "Lake Washington policy" (no discharge to Lake Washington). Other water quality criteria used as a baseline were the NPDES permits in effect and the EPA secondary treatment effluent limitations for surface water

(30 mg/l BOD, 30 mg/l suspended solids). The baseline cost criterion was an EPA threshold for "high cost projects"; for King and Snohomish Counties the threshold is a monthly cost of $40. The baseline land use criterion was compatibility and consistency with applicable municipal and county land use plans and policies.

All 15 alternatives were acceptable when compared to the baseline criteria. The alternative which survived the first stage screening and which had the lowest project present worth cost is Alternative A-1; it is termed the acceptable least cost alternative (ALCA).

The second stage screening was used to determine how well the ALCA and the other alternatives met a more detailed set of benchmark criteria. The ALCA became a benchmark for comparison to the other alternatives. Table 4-3 displays Metro's rating of the 15 initial alternatives against 25 detailed water quality, cost, land use, and other benchmark criteria; these ratings are explained in the Draft Wastewater Management Plan.

The third and final stage of the screening/selection process evaluated alternatives which survived the second screening process; these "final" alternatives had possible overriding benefits justifying further detailed analysis in wastewater management planning. Three alternatives were considered to have possible overriding benefits. These alternatives, plus the ALCA, consist of: Alternative A-1 (the ALCA), Alternative A-3 (centralized treatment, discharge at Point Pulley), Alternative A-5 (centralized treatment, discharge at Alki Point), and Alternative B-1 (dual treatment centers, Renton discharge to the Green/Duwamish River).

Expanded Description of Final Alternatives

Alternative A-1. With Alternative A-1, the Renton treatment plant would treat the combined flows of the entire service area, except the Swamp Creek drainage, which would continue to be served by the West Point treatment plant. Discharge of Renton plant effluent would continue to the Green/Duwamish River. Alternative A-1 is illustrated in Figure 4-2.

Under this alternative, the Renton plant would be expanded to 99 mgd capacity to treat projected 20-year flows. This requires expansion of the existing 72 MGD primary treatment facilities by 27 MGD using the existing treatment scheme and expansion of the activated sludge secondary system by 63 MGD. Expansion of the activated sludge process would

Table 4-3. Metro Rating of Initial Alternatives Against the ALCA to Identify Potential Overriding Benefits

Evaluation criteria	Alternative													
	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	C5
Water Quality Criteria														
DOE water quality standards	=	+	+	+	=	=	+	+	+	=	=	+	+	+
NPDES permit requirements	=	+	+	+	=	=	+	+	+	=	=	+	+	+
EPA effluent limitations	=	=	=	=	=	=	=	=	=	=	=	=	=	=
EPA/DSHS drinking water standards	=	=	=	=	=	=	=	=	=	-	-	-	-	-
Fisheries/shellfish protection	=	+	+	+	=	=	+	+	+	=	=	+	+	+
Reliability	-	+	+	+	+	-	+	+	+	-	-	-	-	-
Receiving water sensitivity	=	+	+	+	=	=	+	+	+	=	=	+	+	+
Consistency with 208	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Cost Criteria														
Monetary costs:														
Present worth	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Capital	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O&M	-	+	+	+	+	-	+	+	+	+	-	+	+	+
Energy/chemical costs:														
Electrical energy	-	+	+	+	+	-	+	+	+	+	-	+	+	+
Chemical	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Labor staff costs	-	=	-	-	-	-	-	-	-	-	-	-	-	-
Reuse potential	=	=	=	=	=	=	=	=	=	=	=	=	=	=
EPA/DOE financing	-	=	=	=	=	-	=	=	=	=	-	=	=	=
Impact of inflation	-	+	+	+	+	-	+	+	+	+	-	+	+	+
User rates	-	+	-	-	-	-	-	-	-	-	-	-	-	-
Cost-sharing potential	=	=	+	+	=	=	=	+	+	=	=	=	+	+
Discount rate	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Planning period	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Land Use Criteria														
Compatibility	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Flexibility and staged construction	=	=	=	=	+	+	+	+	+	+	+	+	+	+
Site impacts	-	=	-	-	-	-	-	-	-	-	-	-	-	-
Site acquisition	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Criteria														
Public input	=	+	+	+	+	+	+	+	+	+	+	+	+	+
Environmental	=	=	=	=	=	=	=	=	=	=	=	=	=	=
Compatibility with Puget Sound plans	=	=	+	+	=	=	=	+	+	=	=	=	+	+

KEY:
+ Advantage compared with ALCA
- Disadvantage compared with ALCA
= No net advantage/disadvantage

SOURCE: Metro, 1980g.

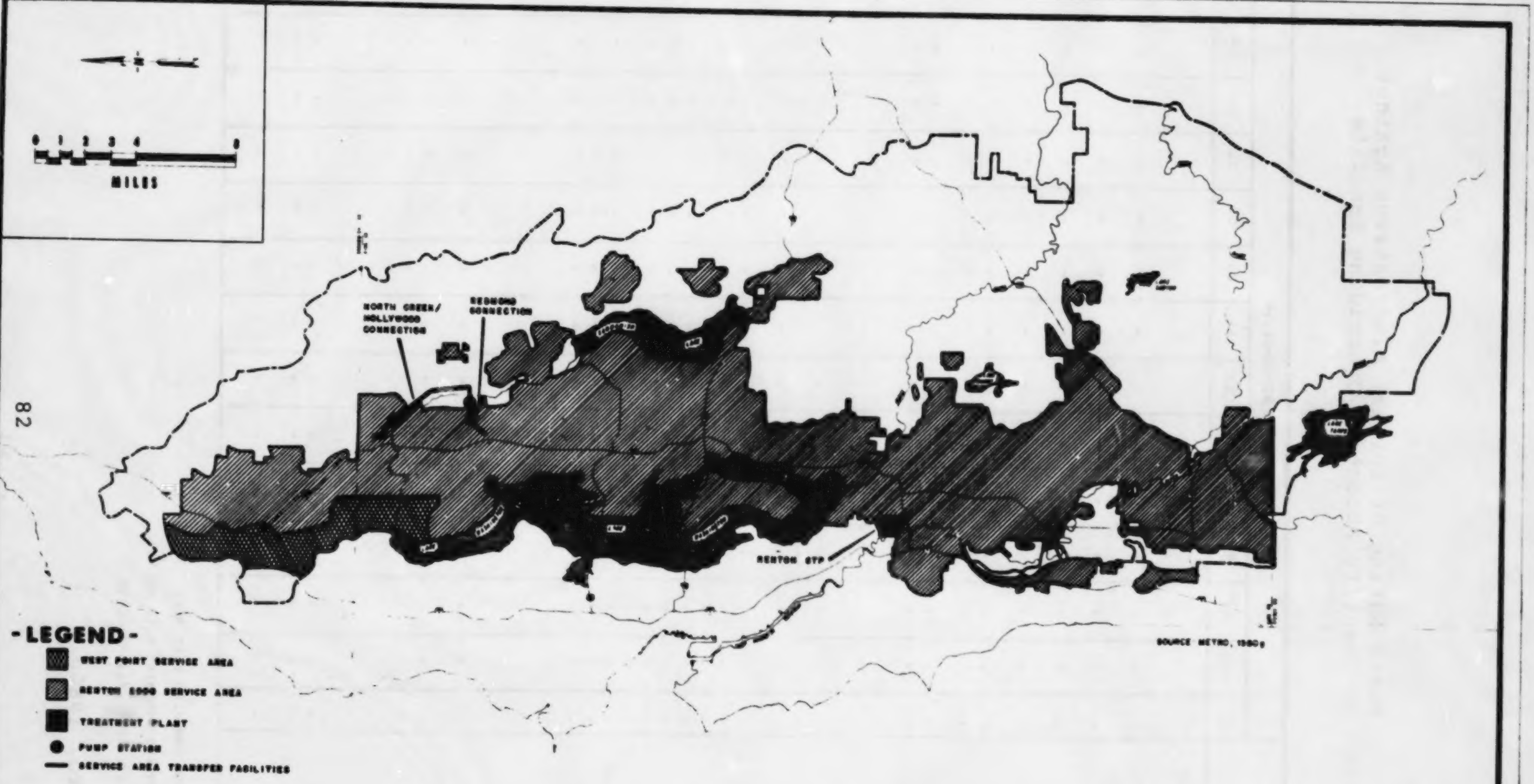


FIGURE 4-2. ALTERNATIVE A-1

include additional equipment and process modifications to provide nitrification. The current design of the Renton treatment plant lends itself to increases in capacity by increments of 18 mgd to keep the plant in hydraulic balance. Nine mgd increments may be used, but operationally the balance is considered by Metro to be more difficult.

All solids captured at the Renton plant would be treated at the Renton treatment plant site, and solids would no longer be pumped to the West Point plant. Proposed solids handling facilities include gravity thickening for primary sludge, air flotation thickening for waste-activated sludge, and anaerobic digestion stabilization, followed by belt or filter press dewatering. The dewatered solids would be transported to final land disposal/reuse sites; the status of Metro's long-term solids management planning is discussed later in this chapter. Methane gas produced during anaerobic digestion would be utilized at the plant by gas engines, either directly driving process units or electrical generators.

Collection system modifications would be required for Alternative A-1. Construction of the Redmond connection and the North Creek/Hollywood connection would be required to route North Lake Sammamish and North Lake Washington flows to the Renton plant; these areas are currently served by Metro's West Point plant. The Redmond connection includes two pumping stations and force mains capable of transporting an ultimate capacity of 75 MGD. The North Creek/Hollywood connection consists of one pumping station and about 24,000 feet of interceptor piping.

The construction is proposed to take place in two phases. The first phase would bring the Renton treatment plant capacity up to 72 MGD, including solids handling, by 1985. The second phase would increase the plant capacity to 99 MGD by 1990. The Redmond connection would be completed by 1984, and the North Creek/Hollywood connection would be constructed concurrently with the second expansion of the plant. Those facilities that cannot easily be staged (e.g., tunnels and gravity sewers) would be sized for an ultimate planning period of 50 years.

The Phase 1 capital program is estimated to cost $164.1 million, of which $145.3 million is for plant expansion and $18.8 million for implementing service area changes. The Phase 2 capital program is estimated to cost $98.1 million, of which $77.9 million is for plant expansion and $20.2 million is for service area modification. The annual O&M cost, averaged over the planning period, is $12.6 million. The project's present worth is $267 million.

The impact on user rates is a function of the project costs, the level of grant support, and annual costs of O&M. If no grant funds were available the rate increase due to Alternative A-1 would be $5.40 per month; with 50 percent grant funding it would be $3.50 per month; and with 75 percent grant funding it would be $2.50 per month.

It is expected that about 98,000,000 Kwh per year will be required to treat the 99 MGD under Alternative A-1; this translates to about 2,710 Kwh per million gallons. Annual tons of chemicals used for Alternative A-1 can be anticipated to be 760 tons per year of chlorine, 240 tons per year of sulfur dioxide and 4.3 tons per year of ferric chloride.

Alternative A-3. Alternative A-3, like Alternative A-1, is a centralized treatment scheme. However, Alternative A-3 calls for discharge of treated effluent to Puget Sound in the Point Pulley area. The marine discharge allows a reduced level of treatment. The advanced secondary treatment of Alternative A-1 may be reduced to a basic secondary treatment scheme, as defined by EPA requirements (i.e., 30 mg/l BOD and 30 mg/l SS). Alternative A-3 is illustrated in Figure 4-3.

This alternative calls for treating an incoming liquid stream of 99 MGD to meet the 30/30 effluent requirements. Because the degree of treatment is less, the capacity rating on the existing secondary treatment elements may be uprated, thus reducing the size of additional needed facilities. Effluent from the Renton plant would be discharged through a tunnel into the marine waters of Puget Sound in the vicinity of Three Tree Point.

All solids collected at the Renton plant would be treated on the Renton treatment plant site, using the same sludge handling facilities as Alternative A-1. Since the amount of solids will be less than with Alternative A-1, the sludge treatment units may be downsized accordingly.

The collection system modifications proposed for Alternative A-3 are the same as those for Alternative A-1, the Redmond connection and the North Creek/Hollywood connection.

Project staging for Alternative A-3 is in two phases. Phase 1 calls for expansion of the treatment plant capacity to 72 MGD, with construction completed by 1985. Phase 2 would add 27 MGD capacity, with construction completed by 1990. Collection system modifications would be staged and sized as in Alternative A-1.

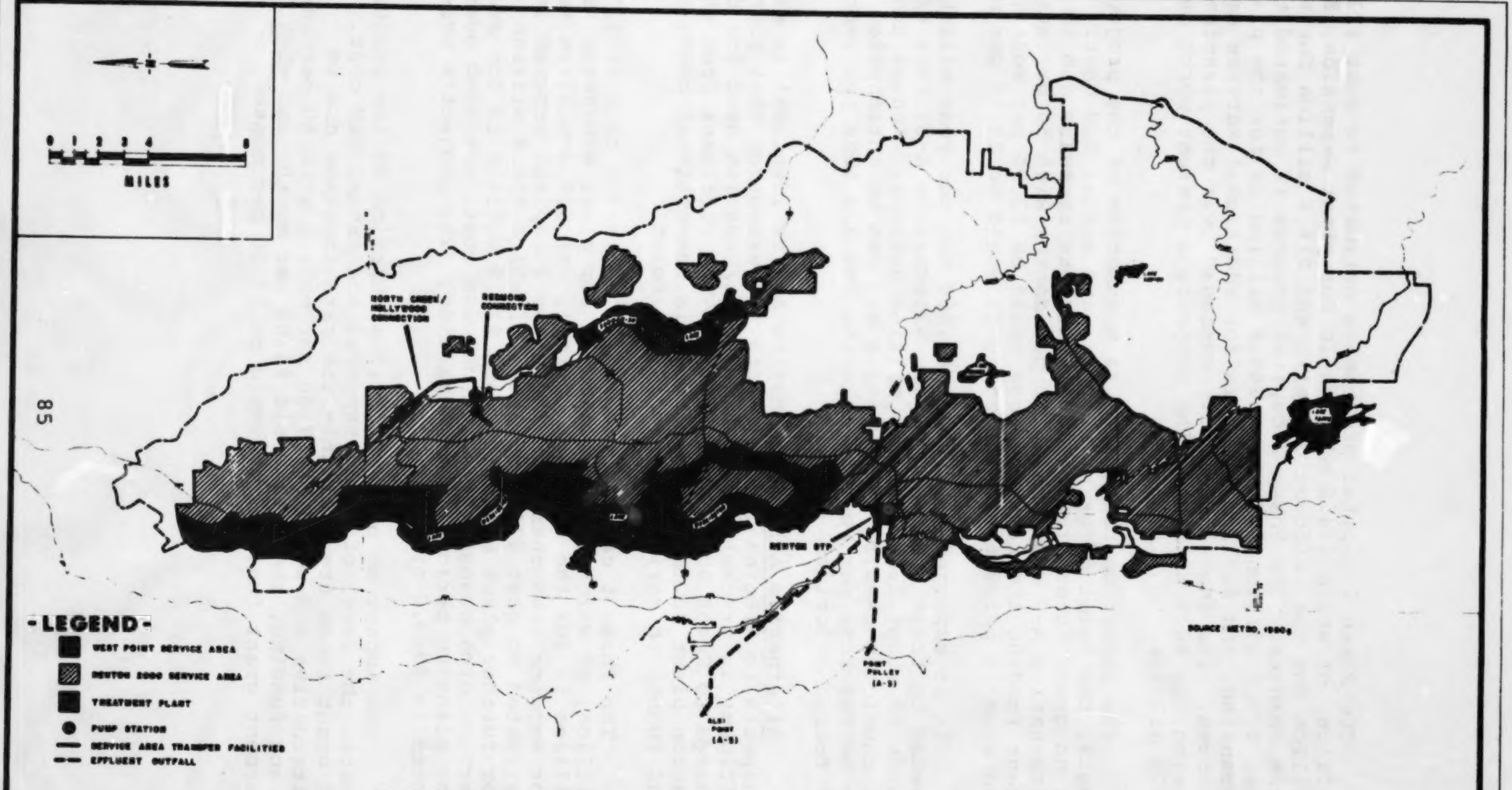


FIGURE 4-3. ALTERNATIVES A-3 & A-5 (PREFERRED PROGRAM)

The Phase 1 capital program is estimated to cost $233.8 million, of which $74.8 million is for plant expansion, $140.2 million for the effluent outfall, and $18.8 million for service area changes. The Phase 2 capital program is estimated to cost $76.0 million, of which $55.8 million is for the plant expansion, and $20.2 million is for additional service area changes. The annual O&M cost, averaged over the planning period, is $8.9 million. The projects's present worth is $279 million.

The impact on user rates is a function of the project costs, the level of grant support, and annual O&M cost. If no grant funds are available the rate increase due to Alternative A-3 would be $5.50 per month; with 50 percent grant funding the rate increase would be $3.20 per month; and with 75 percent grant funding it would be $2.10 per month.

It is expected that about 87,000 Kwh per year will be needed to treat the 99 MGD using Alternative A-3; this translates to about 2,410 Kwh per million gallons. Annual tons of chemicals used for Alternative A-3 can be anticipated to be 760 tons per year of chlorine and 3.9 tons per year of ferric chloride.

Alternative A-5. Alternative A-5 is identical in all respects to Alternative A-3, with the exception that plant effluent is transmitted to Alki Point/Duwamish Head for discharge to Puget Sound (see Figure 4-3). Effluent from the Renton plant would be discharged via conventional conduit and tunnel to marine water off Alki Point.

The Phase 1 capital program is estimated to cost $318.5 million, of which $74.8 million is for plant expansion, $224.9 million is for the effluent outfall, and $18.8 million is for service area changes. The Phase 2 capital program is estimated to cost $76.0 million, of which $55.8 million is for further plant expansion, and $20.2 million is for additional service area changes. The annual O&M cost, averaged over the planning period, is $9.3 million. The project's present worth is $345.0 million.

The impact on user rates is a function of the project costs, the level of grant support, and annual O&M cost. If no grant funds are available the rate increase due to Alternative A-5 would be $7.00 per month; with 50 percent grant funding, the rate would $4.00 per month; and with 75 percent grant funding, it would be $2.50 per month.

It is expected that about 89,000,000 Kwh per year will be needed to treat the 99 MGD using Alternative A-5; this translates to about 2,460 Kwh per million gallons. Annual tons of chemicals used in Alternative A-5 can be anticipated to be 760 tons per year of chlorine and 3.9 tons per year of ferric chloride.

Alternative B-1. Alternative B-1 is a dual treatment center alternative whereby the Renton plant would continue to serve the existing Renton service area and a new Kenmore treatment plant would serve the north part of the study area currently tributary to West Point. Under Alternative B-1, Renton treatment plant would be expanded to 72 MGD. The level of treatment would also be upgraded to an advanced secondary system with nitrification. Alternative B-1 is illustrated in Figure 4-4.

Under Alternative B-1 a new 27 MGD treatment plant would be constructed in the Kenmore vicinity. The plant's treatment processes would be similar to those of the existing Renton plant. It would utilize conventional primary sedimentation followed by an activated sludge secondary system, clarification chlorination and dechlorination. The Kenmore plant would be designed and operated to produce a 30/30 effluent (30 mg/l each of BOD and SS).

Solids handling processes for the 72 MGD Renton facility would be identical to Alternatives A-1, A-3, and A-5. The Renton plant, with its upgraded treatment, would discharge directly to the Green/Duwamish River. The Kenmore plant would require construction of a tunnel and outfall to Richmond Beach for discharge to Puget Sound.

Alternative B-1 does not require the construction of either the Redmond connection or the North Creek/Hollywood interceptor. No major collection system modifications are required for this option.

The staging for Alternative B-1 is also in two phases. Phase 1 calls for expansion of the Renton plant, construction of Renton plant solids handling facilities, and construction of 18 MGD capacity at the Kenmore plant, together with the tunnel and outfall for effluent disposal. All of the Phase 1 construction would be completed by 1985. Phase 2 construction, to be completed by 1990, calls for expansion of the Kenmore plant to 27 MGD.

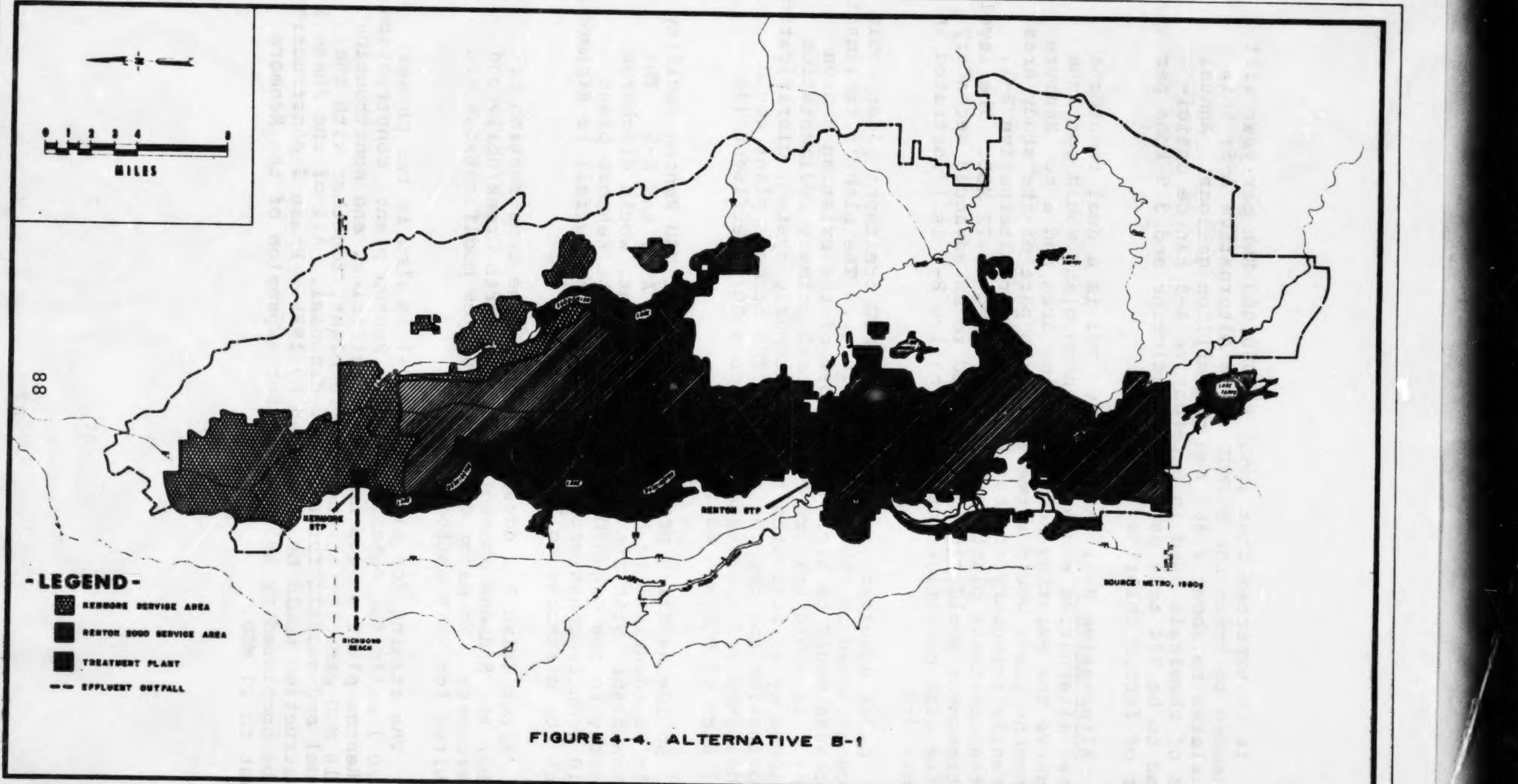


FIGURE 4-4. ALTERNATIVE B-1

The Phase 1 capital program is estimated to cost $294.8 million, of which $145.3 million is for the Renton plant, $51.3 million is for the Kenmore plant, and $98.2 million is for the Kenmore plant outfall to Richmond Beach. The Phase 2 capital program is estimated to cost $27.8 million for expansion of the Kenmore plant. The annual O&M cost, averaged over the planning period, is $11.4 million. The project's present worth is $329.0 million.

The impact on user rates is a function of the project costs, the level of grant support, and annual O&M cost. If no grant funds are available the rate increase due to Alternative B-1 would be $6.10 per month; with 50 percent funding, the rate increase would be $3.70 per month; and with 75 percent grant funds, it would be $2.60 per month.

It is expected that about 75,000,000 Kwh per year will be needed to treat the 99 MGD using Alternative B-1; this translates to about 2,080 Kwh per million gallons. Annual tons of chemicals used for Alternative B-1 can be anticipated to be 550 tons per year of chlorine, 170 tons per year of sulfur dioxide, and 3.8 tons per year of ferric chloride.

Collection System Changes

The Redmond connection and the North Creek/Hollywood connection are the primary changes in the collection system. Both include gravity sewers, pump stations, and force mains. Metro selected a 50-year staging period as most cost-effective for sizing gravity sewers, pump station structures, and purchase of land and rights-of-way. All other parts of the collection system are sized for 20 years.

The Redmond connection includes two pumping stations, the York station, with an ultimate capacity of 75 MGD and three force mains, and the Totem Lake station, with an ultimate capacity of 75 MGD with twin force mains. Costs and phasing of the Redmond connection are shown in Table 4-4. Previous Metro studies (Metro, 1978g) have identified the preferred route alignment, and Metro is currently securing needed rights-of-way. Metro projects that the Redmond connection should be ready for detailed design in 1981.

The North Creek/Hollywood connection would not be on-line until 1993. The North Creek/Hollywood connection would have an ultimate capacity of 37 MGD, and would include construction of one new pump station, the Woodinville station. Costs and phasing for this project are shown in Table 4-4. Metro has deferred detailed staging and alignment decisions for the North Creek/Hollywood connection until planning for Phase 2 is initiated.

Table 4-4. Costs for Redmond Connection and North Creek/Hollywood Connection - Alternatives A-3/A-5

Facility	Item	Quantity	Estimated cost, million dollars[a]	
			Phase 1	Phase 2
Redmond Connection, 75 mgd[d]				
North Lake Sammamish interceptor	108-in. RCP	2,600 ft	2.34	
York pump station				
Phase 1, 30 mgd	Station	3 pumps at 15 mgd	3.40	
	30-in. force main	2 at 1,400 ft	0.26	
Phase 2, 75 mgd	Pumps	3 at 15 mgd		0.30
	30-in. force main	1 at 1,400 ft		0.10
Totem Lake interceptor	84-in. RCP	4,100 ft	2.26	
Totem Lake pump station				
Phase 1, 30 mgd	Station	3 pumps at 15 mgd	3.40	
	36-in. force main	1 at 3,100 ft	0.44	
Phase 2, 75 mgd	Pump	3 at 15 mgd		0.30
	36-in. force main	1 at 3,100 ft		0.37
Redmond interceptor extension	54-in. RCP	1,300 ft	0.39	
Other costs[b]			0.63	
Subtotal			13.43	1.07
Engineering, taxes, contingencies at 40 percent			5.37	0.43
Redmond Connection, total project cost			18.80	1.50

Table 4-4. Cont'd.

Facility	Item	Quantity	Estimated cost, million dollars[a]	
			Phase 1	Phase 2
North Creek/Hollywood Connection, 37 mgd				
North Creek/Woodinville	60-in. RCP	3,700 ft		1.44
	54-in. RCP	1,700 ft		0.51
Woodinville pump station	New 37-mgd station	1		3.60
Woodinville/Hollywood	60-in. RCP	18,500 ft		7.22
Other[b]				0.60
Subtotal				13.37
Engineering, taxes, contingency at 40 percent				5.35
North Creek/Hollywood connection, total project cost				18.72
Annual O&M[c]			0.58	0.13
Present worth			19.10	6.30

[a] ENR-CCI 3500.

[b] Includes special construction requirements such as utility interference, railroad, highway, or river crossings, and land or easement purchases.

[c] Based on mid-point of planning period.

[d] Listed in this figure are the "firm capacities" for each of the pump stations. Firm capacity means the capacity of the pump station with one pump not operating and used as a reserve pump.

SOURCE: Metro, 1980g.

Under the recommended program in the Final Plan, the decision whether to construct the Redmond connection and North Creek/Hollywood connection would be deferred. Sewered areas currently tributary to the West Point plant may continue to be served by that plant unless future planning decisions call for diversion of these flows to the Renton plant.

Wastewater Treatment

The Renton plant would be expanded to treat a total capacity of 99 MGD and to produce an effluent that contains not more than 30 mg/l BOD and 30 mg/l SS. First phase expansion would increase the capacity of the secondary activated sludge units from 36 to 72 MGD. Second phase construction would increase the capacity of the entire plant from 72 to 99 MGD. Costs for Renton treatment plant liquid stream improvements with the preferred program are shown in Table 4-5.

Under the recommended program in the Final Plan, the Renton plant would be expanded to treat a total capacity of 72 MGD. The second phase of expansion to 99 MGD would not be needed unless flows from the West Point service areas are diverted to the Renton plant.

Solids Handling

The proposed solids handling processes are based on Metro's assumption that the preferred solids disposal method will be land application. The proposed processing will utilize gravity thickening of waste-activated sludge, anaerobic digestion and dewatering. Methane gas is proposed to be recovered from the anaerobic digestion process and used as a fuel for engine-driven pumps and blowers. Other waste heat recovery schemes are also proposed. Blend tanks are proposed as a method of controlling odors (if raw sludge bypasses the digesters) and equalizing the flow to the dewatering facilities. Belt filters are proposed for dewatering with the liquid filtrate recycled to the plant. The dry solids would be trucked or railed to a disposal site. Costs for solids handling facilities under Alternatives A-3/A-5 program are shown in Table 4-5.

Under Alternatives A-3/A-5, solids handling processes would be designed to handle solids from 99 MGD of effluent. Under the recommended program in the Final Plan the solids handling processes would be designed to handle solids from 72 MGD of effluent. The second phase of expansion to 99 MGD would not be needed unless flows from the West Point service area are diverted to the Renton plant.

Table 4-5. Costs for Renton Treatment Plant Improvements - Alternatives A-3/A-5

Item	Project cost, million $		
	Phase 1 72 mgd	Phase 2 99 mgd	Total
Liquid Stream			
Primary	0	19.6	19.6
Aeration	14.6	11.2	25.8
Clarifiers	11.2	8.7	19.9
Chlorination and dechlorination	0.4	0.3	0.7
Subtotal	26.2	39.8	66.0
Solids Stream			
Gravity thickening	3.1	0.9	4.0
DAF	6.7	2.4	9.1
Anaerobic digestion	22.7	7.4	30.1
Dewatering	8.4	2.8	11.2
Gas recovery	5.7	1.9	7.6
Mechanical solids handling	2.0	0.6	2.6
Subtotal	48.6	16.0	64.6
Total	74.8	55.8	130.6
Annual O&M [b]			6.8
Present worth			135.8

[a] Based on ENR-CCI = 3500, mid-1980 USWRC discount rate 7-1/8 percent.

[b] Average over the planning period.

SOURCE: Metro, 1980g.

Effluent Disposal

Six alternative routes were proposed to convey Renton effluent to Puget Sound. The costs of each route are presented in Table 4-6 and the location of each route is illustrated in Figure 4-5.

The six alternative routes are summarized below (Metro, 1981):

> "Three Tree Point/Seahurst Park. Heading west from the Renton plant toward the Three Tree Point-Seahurst area, three potential effluent disposal routes were selected. Route A follows South 146th Street, Route B follows South 152nd Street, and Route C heads directly to Three Tree Point following no street alignment. Because right-of-way acquisition is an important consideration in a project such as this, attempts are made to follow existing public easements (i.e., roadways, utilities, etc.). Neither of the roadways mentioned is continuous and so each route would require additional purchase of right-of-way. Route C, however, would require purchase of right-of-way along nearly its entire length.
>
> "All routes would cross the Green/Duwamish River, the City of Tukwila, and would require tunnels to carry effluent under the higher elevation areas of Riverton Heights and Burien. Route A would have a tunnel portal in Seahurst County Park and an outfall located off the beach there. Route B would require purchase of land in the residential area to the west of Lake Burien for a tunnel portal and construction of an outfall. Route C would cross under Sea-Tac Airport and continue to Three Tree Point with a tunnel portal and an outfall located near the point.
>
> "Alki Point/Duwamish Head. Logical routes for discharge off Alki Point or Duwamish Head would follow the Duwamish River downstream to the vicinity of Spokane Street. The Alki Point route would then cross under a narrower width of West Seattle through a tunnel. Three potential routes have been selected for cost-effectiveness analysis. Route D would follow the west side of the Duwamish, traverse West Seattle under S.W. Hanford Street, and have an outfall jutting northwest from Alki Point. Route E would follow the existing sludge force mains (which transfer sludge from Renton to West Point) on the east side of the Duwamish, then follow East Marginal Way to South Idaho Street, and cross the river with the existing West Duwamish Siphon. Route E would then follow the same tunnel alignment as Route D, under S.W. Hanford Street, finishing with an outfall due west off Alki Point. Route F to Duwamish Head would follow the west side of the

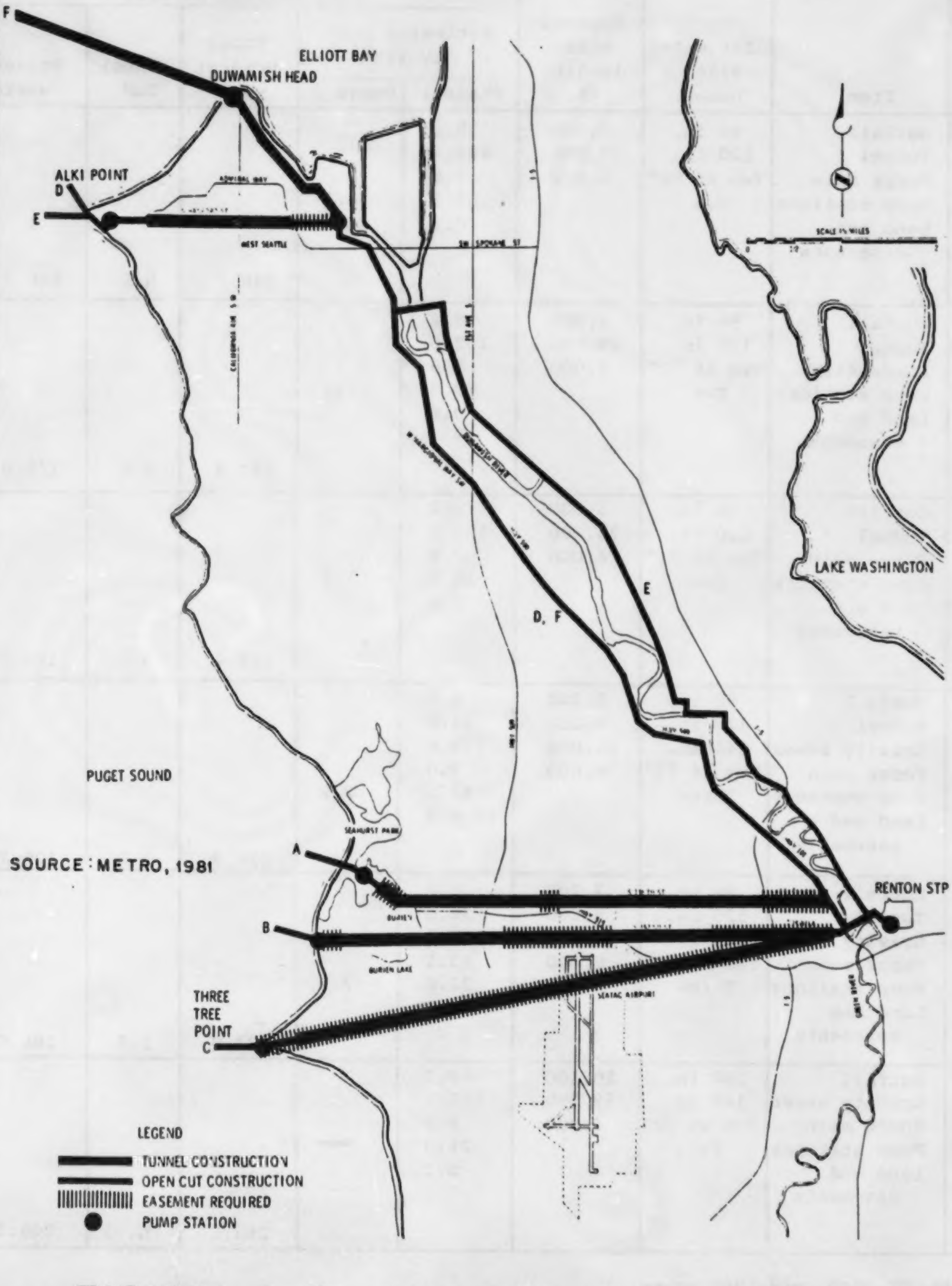
Table 4-6. Cost Comparison of Alternative Effluent Discharge Routes

Route	Item	Estimated size or number	Approximate length, ft.	Cost, million dollars				
				Estimated Cost by item		Total project cost[a]	Annual O&M	Present worth[b]
				Phase 1	Phase 2			
Route A: Seahurst Park	Outfall	96 in.	3,000	9.2				
	Tunnel	120 in.	27,000	102.2				
	Force Main	Two at 72"	4,000	7.6				
	Pump stations	Two		19.6	1.4			
	Land and easements			0.2				
						140.2	0.6	110.2
Route B: Lake Burien	Outfall	96 in.	3,000	9.2				
	Tunnel	120 in.	29,000	109.6				
	Force main	Two at 72"	4,000	7.6				
	Pump stations	Two		19.6	1.4			
	Land and easements			0.5				
						147.9	0.6	115.0
Route C: Three Tree Point	Outfall	96 in.	3,000	9.2				
	Tunnel	120 in.	33,000	124.7				
	Force main	Two at 72"	4,000	7.6				
	Pump stations	Two		19.6	1.4			
	Land and easements			0.9				
						163.4	0.6	128.0
Route D: West Duwamish	Outfall	96 in.	2,200	6.8				
	Tunnel	120 in.	9,200	34.8				
	Gravity sewer	144 in.	51,000	139.8				
	Force main	Two at 72"	4,800	9.0				
	Pump stations	Three		32.0	2.2			
	Land and easements			0.3				
						224.9	1.0	176.2
Route E: East Duwamish	Outfall	96 in.	2,200	6.8				
	Tunnel	120 in.	9,200	34.8				
	Gravity sewer	144 in.	55,000	148.7				
	Force main	Two at 72"	8,000	13.1				
	Pump stations	Three		32.0	2.2			
	Land and easements			0.3				
						237.9	1.0	186.0
Route F: Duwamish Head	Outfall	108 in.	10,100	62.2				
	Gravity sewer	144 in.	59,900	174.5				
	Force main	Two at 72"	2,800	5.6				
	Pump stations	Two		21.0	—			
	Land and easements			0.3				
						263.6	0.92	206.1

[a] Based on ENR-CCI 3500, mid-1980 costs.

[b] U. S. Water Resources Council discount rate: 7 1/8 percent. Present worth assumes single phase construction.

SOURCE: Metro 1981.



SOURCE: METRO, 1981

FIGURE 4-5. ALTERNATIVE EFFLUENT DISCHARGE ROUTES

Duwamish along Interurban Avenue South, West Marginal Way, and 26th Avenue S.W. to Florida Street. From Florida Street the open-cut sewer would follow Harbor Avenue to Duwamish Head and Alki Beach Park with an outfall to the northwest."

Under Alternatives A-3/A-5, the tunnel and outfall would be designed to convey average flows of 144 MGD and peak flows of 325 MGD. Under the recommended program recommended in Metro's Final Plan, this capacity would remain the same.

Solids Disposal Alternatives and Costs

The purpose of this section is to describe the alternatives that Metro is currently considering for disposal of solids generated at its various wastewater treatment plants. Although, certain solids handling methods are being proposed for each of the long-term Renton wastewater management alternatives, ultimate solids disposal is not a part of any of the alternatives.

Metro is currently undertaking a planning study of long-term solids disposal options. As part of this study, a preliminary cost-effectiveness analysis of solids disposal options was conducted (Metro, 1980i); the cost estimates in this preliminary study may be modified as a result of further work. The goal of the cost-effectiveness study was to determine the sludge management program which would, for a 20-year planning period, accomplish specific objectives.

The results of the cost-effectiveness study are reviewed here to establish the relationship between the Renton treatment plant solids handling facilities described earlier and long-term solids disposal alternatives. Environmental assessment of the long-term solids disposal alternatives will, however, occur under a separate NEPA process.

Current Sludge Disposal Methods

Metro's sludge treatment and handling is centralized at the West Point treatment plant. Sludge treatment presently consists of conventional anaerobic digestion to stabilize the sludge and reduce the quantity of volatile solids. The digested sludge is dewatered to achieve a sludge cake that contains about 18 percent solids. The dewatered sludge is then transported to a disposal or reuse site.

Sludge disposal and reuse during the past 15 years have been oriented toward examining the advantages and disadvantages of alternative methods for disposal. The methods examined include deepwater disposal, soil rehabilitation, crop fertilization, energy recovery, and sanitary landfill disposal.

The quantity of sludge during the past 15 years has increased. During the period 1974 through 1979 the average dry tons produced per day ranged from 23 in 1974, to 28 in 1979, approximately a 4 percent increase per year. The recent use of alum to improve treatment process performance has substantially increased the volume of sludge to be treated and continued use of alum will increase the volume of sludge above historic rates of increase. Sludge production for the Metro system is projected to increase from 28 dry tons per day in 1979 to 63 dry tons per day in 1985, to 83 dry tons per day in 2000.

Identification of Options

Eleven options were considered by Metro for sludge utilization or disposal. The options were selected on the basis of: (1) previous operational experience in the Puget Sound area, or wide-scale implementation nationwide; (2) research on utilization options conducted by Metro; and (3) potential for energy recovery. Systemwide treatment of sludge at the West Point and Renton facilities was assumed for all disposal options.

Sludge treatment processes for all use or disposal options were the same, and were identical to the treatment processes proposed for the Renton plant as part of the Draft Wastewater Management Plan. It was assumed that anaerobic digestion would be the principal stabilization process. This process was selected because it is self-sustaining and produces methane gas for energy recovery. It was also assumed that the stabilized sludge could be dewatered by a method that would achieve 18 percent solids before disposal, if needed.

Ocean Disposal. Under this option, digested, liquid sludge would be barged to ocean waters off the Olympic Peninsula which have previously beem permitted as dump sites for munitions and ocean dredge spoils. A force main would be constructed from the Renton plant to a new barging site located either on the Green/Duwamish Waterway or Elliott Bay. This option would be inconsistent with federal policies which discourage ocean disposal of sewage sludge.

Conventional Incineration. Under this option, multiple-hearth incinerators would be installed at both the West Point and Renton treatment plants. Dewatered, undigested sludge would be incinerated on site, and the ash residue would be hauled by truck for final disposal to the King County landfill. Primary sludge at West Point would be put through clarifiers and then dewatered; at the Renton plant, waste-activated sludge would be thickened and then dewatered. Both would then be fed into incinerators. Emission control equipment would be installed to comply with air pollution requirements.

Coincineration. An alternative to conventional incineration would be codisposal of sludge with municipal solid waste. Although there is little operational experience in the U. S. with this technology, coincineration has the potential for significant energy recovery through the generation of steam. For this option, liquid sludge from both treatment plants would be transported by force main to a centralized handling facility in an industrial area for dewatering and combustion, and ash residue would be hauled by truck to the county landfill. The low-grade steam generated by the facility would be sold to local industrial users. Emission controls would be similar to conventional incineration.

Sanitary Landfill. Sanitary landfilling has occasionally been used by Metro in recent years. Under this option, digested and dewatered sludge would be truck-hauled to the county landfill. Landfilling could be implemented at any time; however, the long-term (or 20-year) availability and cost of sanitary landfilling in King County are considered highly uncertain.

Silviculture. Metro has undertaken extensive research on sludge application to forestlands as a soil and plant amendment to provide additional nutrients. The tree growth response to sludge application demonstrated by this research indicates its potential. Two approaches are considered as long-term options by Metro. The first involves hauling digested, dewatered sludge from both treatment plants to a small number of privately owned sites and application to second-growth timber stands. Sludge would be truck-hauled from the treatment plants to these sites and temporarily stored for final application. Spray pumpers would be used for actual application. Under the second approach, liquid sludge (4 percent solids) would be barged to sites on the Kitsap and Olympic Peninsula for spray application to second-growth sites in the same manner as dewatered sludge.

Soil Improvement. Metro has conducted a variety of soil improvement projects. Sludge has been applied to areas with poor soils to amend these soils to produce improved vegetation growth. The soil improvement option involves transporting the digested, dewatered sludge from the treatment plants to the site by truck, and either allowing it to dry on-site, or immediately spreading and tilling it into the soil by plowing, and then seeding. The sludge can be mixed with sand or sawdust at the point of application to improve the mixing process, depending on the condition of existing site soils. The application sites would include a portion of land to be purchased and maintained by Metro. The sites could be used for a variety of purposes following sludge application.

Composting. Composting digested, dewatered sludge could provide a nonagricultural fertilizer for use in parks, roadsides, recreation areas, and other publicly-controlled lands. This option consists of a central facility for sludge storage, composting, and stockpiling of the final product. Digested, dewatered sludge would be hauled by truck to this facility, and the composted product would be delivered by truck to the consumers. The composting method used would consist of large, static windrows similar to those being examined in an ongoing University of Washington demonstration project. Application of the compost product would be subject to regulation under provisions of the Resource Conservation and Recovery Act of 1976 (RCRA).

Agricultural Use. Two options were considered by Metro for agricultural use of digested, liquid sludge. In the first, the land required would be purchased, with possible leasing arrangement for tenant farmers; in the second, land use agreements would be developed with private farmers and Metro would assume application costs. The land considered appropriate for the agricultural application, based on agricultural use and proximity to the treatment plants, would be located in the Green River Valley and the Enumclaw Plateau. Sludge would be transported by force main to storage lagoons and then applied to the agricultural sites by tank trucks equipped with pumps. Application would be subject to regulation under RCRA.

Selection of A Recommended Program

The advantages, disadvantages, and costs of each candidate program have been discussed in detail in Metro's sludge disposal cost-effective analysis. The costs of the options are tabulated in Table 4-7. Based on a comparison of each option's reliability, flexibility, environmental impact, reuse potential, public acceptance, and cost, Metro has developed a preliminary program design with the following elements:

Table 4-7. Costs of Candidate Sludge Disposal Systems

Candidate System	Annual Cost ($1,000)	Present Worth ($1,000)	Unit Cost ($/dry ton)
Puget Sound Outfall	6,154	69,167	280
Ocean Dispersal	8,021	90,151	365
Conventional Incineration	12,205	137,177	554
Co-incineration	15,159	170,378	689
Sanitary Landfill	9,996	112,349	454
Silviculture (18%)	9,966	112,349	453
Silviculture (4%)	8,040	90,364	366
Composting	9,790	110,034	445
Soil Improvement	11,488	129,118	524
Agriculture w/land	18,722	210,424	851
Agriculture w/o land	13,552	152,316	616

SOURCE: Metro, 1980i.

- From 85-90 percent of Metro's sludge will be used as a forest and plant amendment for the 20-year planning period. The use of trucks vs. barges has not been determined.

- A small percentage of the sludge will be used for reclaiming marginal and poor soils. Land will be purchased and leased for this purpose.

- A small percentage of Metro's sludge will be composted sludge. The product will be made available for distribution to public agencies and commercial bulk users for public landscaping projects.

It is estimated that the proposed project will require from $392-$505 per dry ton of sludge depending on the final program mix selected.

Chapter 5

CONSTRUCTION AND SITE-RELATED IMPACTS OF ALTERNATIVES

Overview

Each of the long-term wastewater management alternatives for the Lake Washington-Green River Basins has different components. Each of these project components will have different construction or site-related impacts on the environment.

Table 5-1 is a summary rating of the construction and site-related impacts of the components making up each alternative; the table also lists mitigation measures for each adverse impact. For Alternatives A-3/A-5, all the project components are shown. For other long-term alternatives, only the components in addition to those required for the preferred program are listed; it should be noted that implementation of these alternatives would also eliminate the need for construction of one or more Alternatives A-3/A-5 components.

Table 5-1 indicates that, in general, construction and site-related impacts associated with project components are minor, except for certain impacts of constructing the effluent tunnel and outfall under Alternatives A-3/A-5 or Alternative B-1. None of the impacts shown in Table 5-1 would occur if the no-project alternative were implemented.

The remainder of the chapter expands upon construction and site-related impacts of each alternative. The last section is a comparative analysis of the construction employment impacts of the long-term alternatives.

Impacts of Alternatives A-3/A-5

Alternatives A-3/A-5 include construction of the following components: collection system changes (Redmond connection, North Creek/Hollywood connection), Renton treatment plant expansion, solids handling facilities, and a tunnel and outfall to Puget Sound.

Construction impacts of the recommended program in Metro's final plan will be less than for Alternatives A-3/A-5 because collection system changes would not be needed and because the Renton treatment plant treatment processes and sludge handling facilities could be designed to accommodate 72 MGD

Table 5-1. Overview of Construction and Site-Related Impacts of Project Components

	Alternatives A-3/A-5						A1[a]	B1[a]	
Impacts	Redmond Connection	North Creek/Hollywood Connection	Renton Treatment Plant Expansion	Solids Handling Facilities	Tunnel/Outfall	Nitrification at Renton Treatment Plant	Kenmore Treatment Plant	Kenmore Treatment Plant Tunnel/ Outfall	General Mitigation Measures[b]
Potential incompatibility with adjacent land uses	x	x	o	x	x	o	?	o	Establish adequate buffer zones Design treatment plant to blend with neighborhood Adequate odor controls Minimize night operations
Disruption of recreational uses	o	x	o	o	X	o	o	X	Schedule construction during off-peak recreation periods
Cultural resources	?	?	o	o	?	o	?	?	Conduct detailed archeological survey prior to construction If resources found during construction, halt work and call in qualified archeologist
Traffic disruption	x	x	x	x	X	x	x	x	Reroute traffic around construction sites and provide flagmen
Visual aesthetics	x	x	x	x	x	x	x	x	Fence or otherwise screen construction maintenance areas Revegetate denuded areas Store equipment in areas that are not highly visible
Safety hazards	x	x	x	x	x	x	x	x	Keep curious bystanders away from construction sites Minimize length of time trenches are left open
Noise and dust	x	x	x	x	x	x	x	x	Keep soil watered down Require vehicle noise controls Minimize night operations
Spoils disposal	x	x	x	x	X	x	x	X	Use spoils for fill or dispose in a an acceptable location
Construction equipment exhaust emissions	x	x	x	x	x	x	x	x	Keep engines in tune
Soil erosion	x	x	x	x	X	x	x	x	Confine soil and vegetation removal to smallest possible area Reseed or replant disturbed areas as soon as possible
Loss of vegetation; wildlife disturbance	x	x	x	x	x	x	x	x	Minimize removal of native vegetation Reseed or replant disturbed areas as soon as possible
Surface water quality and aquatic biology impacts	x	x	o	o	x	o	o	x	Construction should occur during low flow periods and when anadromous fish would be least affected
Disruption of benthic habitat	x	o	o	o	x	o	o	x	Limit areas of disturbance to immediate outfall location
Construction employment	+	+	+	+	+	+	+	+	None required

Explanation of Impact Ratings:

o - no impact
x - minor adverse impact
X - moderate adverse impact
? - uncertain impact
+ - beneficial impact

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[a] Only project components in addition to those required for Alternatives A-3/A-5 are listed; these alternatives would also eliminate the need for construction of one or more Alternatives A-3/A-5 components - see text. Alternatives A-1 and B-1 also require purchase of an additional 19 acres at the Renton treatment plant site; this is an adverse impact not shared by the Alternatives A-3/A-5.

[b] Specific mitigation measures for the Seahurst Park tunnel/outfall route are described later in this chapter.

of effluent by the year 2000, rather than 99 MGD. The construction impacts described below for Alternatives A-3/A-5 thus represent "worst-case" impacts that would result if a decision is subsequently made to divert flows from the north part of the study area to the Renton plant.

Collection System Changes

Redmond Connection.

Description of Existing Environment. The proposed Redmond connection would be located in the vicinity of N.E. 124th Street and a branch of the Burlington Northern Railroad system just east of Totem Lake, King County (Figure 5-1). Northeast 124th Street provides access from Interstate 405 to State Route 202 and Avondale west of the Sammamish River. Land use along the 12,500-foot-long alignment is a mixture of industrial, commercial, transportation, agriculture (turf and pasture), and recreation (Sammamish River). Both the Totem Lake and York pumping stations would be located adjacent to the Burlington Northern Railroad tracks.

Topography along a major portion of the alignment is gently sloping, with a steep gradient between the western branch of the Burlington Northern Railroad and 142nd Avenue N.E. The steep portion (approximately 500 feet) is considered an erosion hazard area by King County (Department of Planning and Community Development (1980a).

Vegetation, for the most part, consists of herbaceous growth (grasses, forbs) scattered patches of second-growth (big leaf maple), and introduced species (in urban areas). Approximately 2,300 feet of the alignment is within the 100-year floodplain of the Sammamish River (Department of Planning and Community Development, 1980a).

Approximately 2,600 feet of the Redmond connection (the North Lake Sammamish interceptor and York pumping station portion) paralleling N.E. 124th Street will be constructed within the Sammamish Valley/Bear Creek Agricultural District (Class II soils).

Alternative routes for the Redmond connection have not been developed by Metro. If the decision is made to build the Redmond connection, future environmental analyses will consider in greater detail the impacts of the proposed route and alternatives.

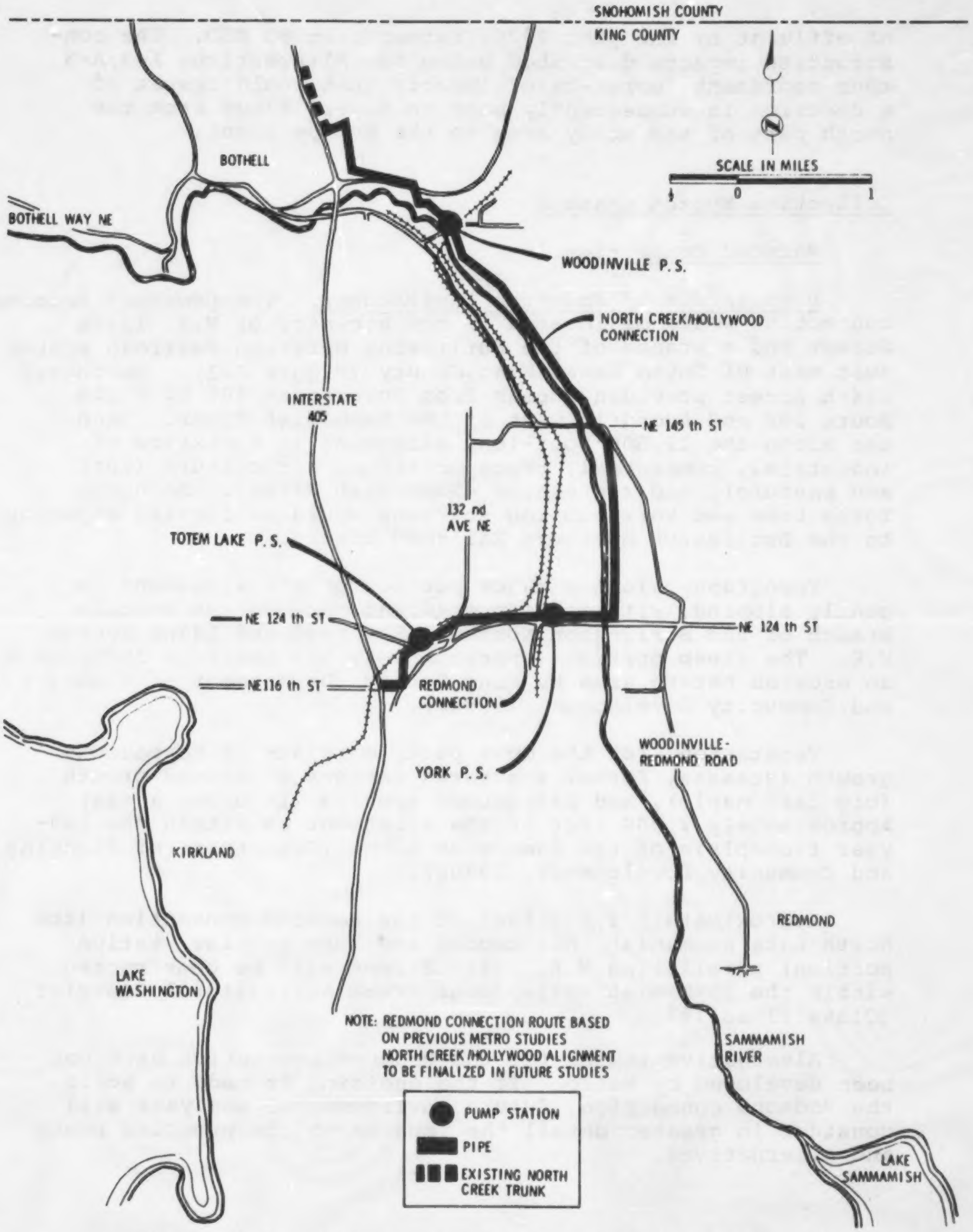


Figure 5-1. Alignment of Redmond Connection and North Creek/Hollywood Connection

SOURCE: Metro, 1980g.

Assessment of Impacts. Table 5-1 presents an overview of construction and site-related impacts of the Redmond connection and lists mitigation measures for adverse impacts. Virtually all features of the Redmond connection (pump stations, gravity pipes and force mains) will lie adjacent to existing transportation corridors (N.E. 116th Street, N.E. 124th Street and the Burlington Northern Railroad), and will be compatible with existing land uses and zoning. Easements will be required through or adjacent to 31 parcels. Some fill will be required in the vicinity of the York pumping station, near Slater Avenue N.E. (N.E. 124th Street) and at the Totem Lake pumping station.

The impact on cultural resources is uncertain at this time. Portions of the alignment (specifically the North Lake Sammamish Interceptor) will lie within an area of high potential for archeological resources. However, much of the alignment has been greatly disturbed by previous construction activities. Once the precise alignment is known an archeological survey will be conducted.

According to the King County sensitive areas map folio (1980), portions of the alignment will be within seismic and erosion hazard areas and within the 100-year floodplain of the Sammamish River. Furthermore, construction will be necessary within the riverbed of the Sammamish River at one point. Special construction techniques would be necessary to prevent erosion problems on the steep slopes and major impacts on water quality and streambed conditions within the Sammamish River.

Construction of a portion of the York force mains may require removal of several big-leaf maple trees at the corner of N.E. 124th Street and Burlington Northern Railroad, and of an unoccupied structure on the northwest corner of the intersection.

A number of adverse impacts could be created by construction of the Redmond connection. In the future, if it is decided to build the Redmond connection, the Final EIS for Metro's Puget Sound plants will include mitigation measures for impacts from that construction.

North Creek/Hollywood Connection.

Description of Existing Environment. Much of the proposed North Creek/Hollywood connection will traverse agricultural land from Woodinville south to the existing Hollywood pumping station at N.E. 124th Street (see Figure 5-1). Scattered areas of transportation and commercial land uses occur in Hollywood and Woodinville near State Route 522.

Topography along the route is relatively flat, particularly from Woodinville south to the Hollywood pumping station. Some scattered wetlands occur along the east side of the Sammamish River, south of Woodinville (King County, 1980).

Assessment of Impacts. Table 5-1 presents an overview of construction and site-related impacts of the North Creek/Hollywood connection, and lists mitigation measures for adverse impacts. The North Creek/Hollywood connection is projected to be a Phase 2 project, and for that reason the exact alignment is not known at this time.

The alignment would pass through areas considered sensitive by King County. Most of the alignment from Bothell south to N.E. 124th Street would be within a Class III seismic hazard area and the 100-year floodplain of the Sammamish River and Bear Creek. The alignment would require one stream crossing (Bear Creek) and construction through several wetlands just south of Woodinville (King County, 1980).

The proposed pipeline would also traverse land within the Sammamish Valley/Bear Creek Agricultural District and would parallel the Sammamish River Parkway.

Special construction methods will be necessary to handle potential seismic risks and to ensure the continued viability of the wetland areas.

A number of adverse impacts could be created by construction of the North Creek/Hollywood connection. In the future, if it is decided to build the North Creek/Hollywood connection, the Final EIS for Metro's Puget Sound plants will include mitigation measures for impacts from that construction.

Renton Treatment Plant Expansion

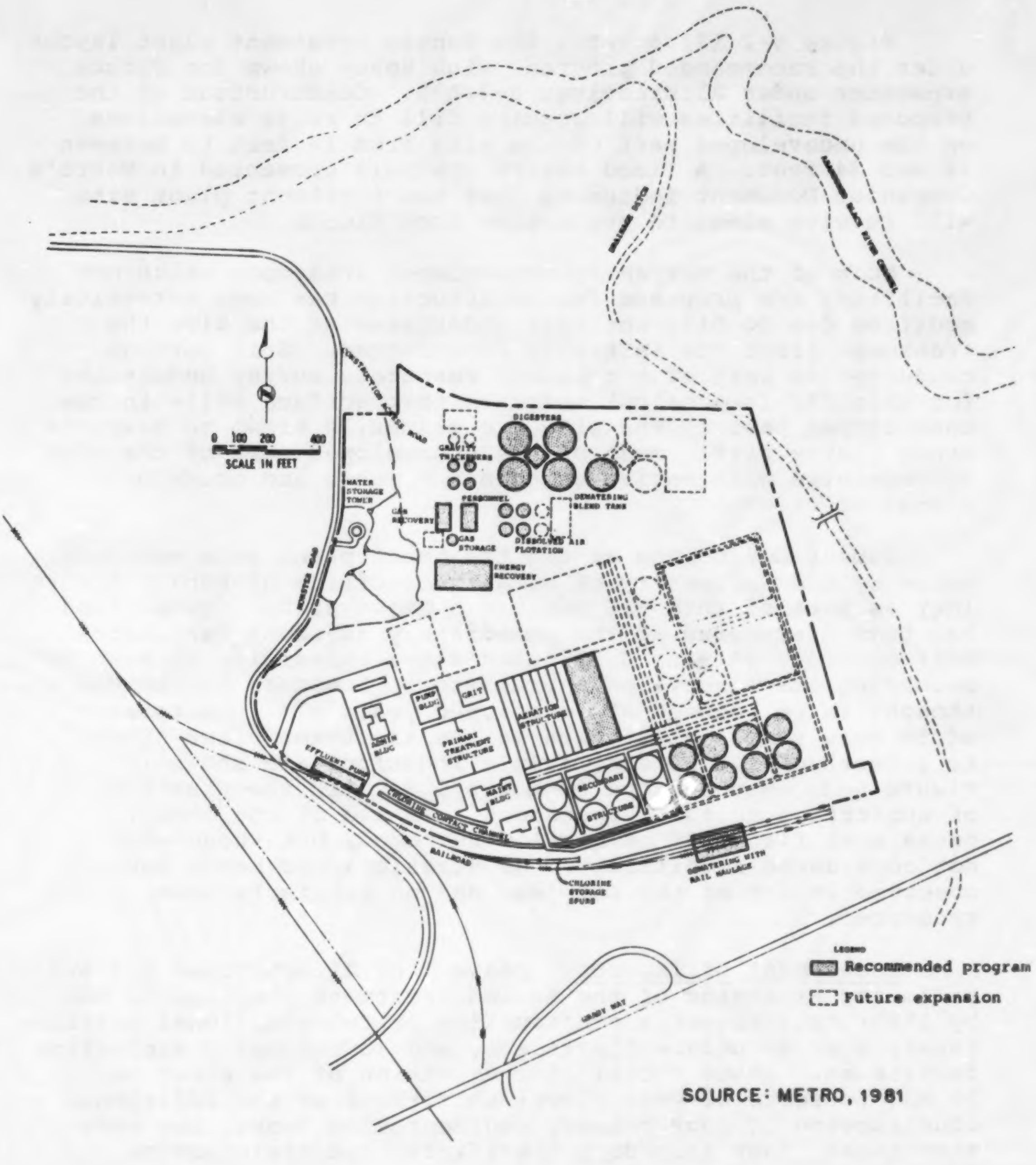
Description of Existing Environment. The Renton treatment plant is located next to the Green/Duwamish River in a predominantly industrial area at the western edge of the City of Renton. The site is surrounded by industrial and railroad uses. A hill is located on the western edge of the property. The hill constitutes a significant constraint on the location of planned improvements to the plant.

Figure 5-2 illustrates the Renton treatment plant layout under the recommended program, with space shown for future expansion under Alternatives A-3/A-5. Construction of the proposed facilities will require fill to raise elevations on the undeveloped part of the site from 16 feet to between 26 and 34 feet. A flood hazard analysis presented in Metro's Companion Document indicates that the treatment plant site will receive adequate protection from floods.

Much of the currently undeveloped area upon which new facilities are proposed for construction has been extensively modified due to fill activity undertaken at the time the treatment plant was initially constructed. Soil corings conducted as part of a cultural resources survey undertaken for this EIS (see below) indicate that surface soils in the undeveloped part of the site are primarily brown to grayish-brown clayey silt. Most of the undeveloped part of the site is vegetated with native grasses and weeds and occasional stands of trees.

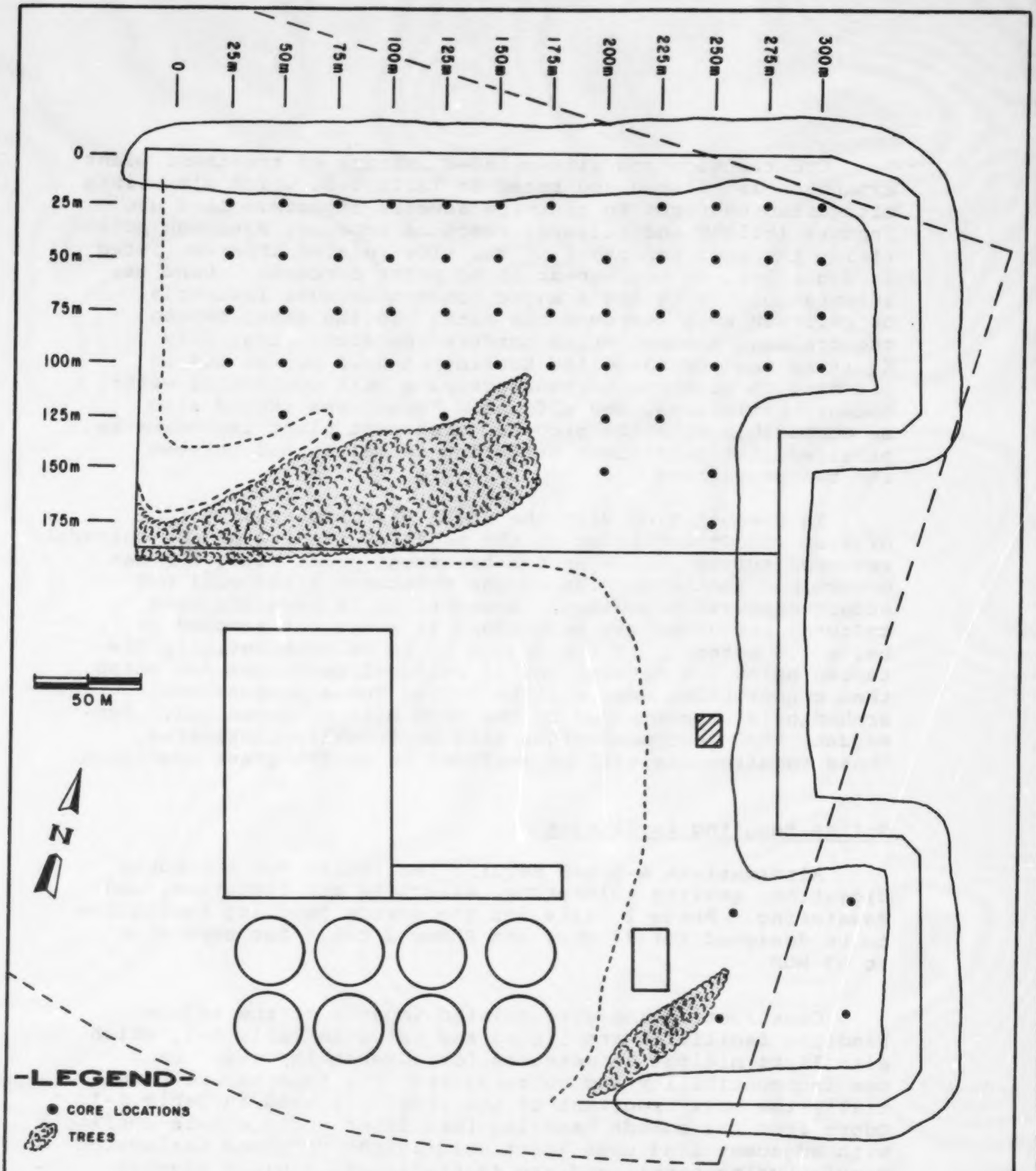
Subsurface coring at the treatment plant site was undertaken by the University of Washington Office of Public Archeology as part of this EIS because a major archeological find had been discovered at the immediately adjacent Earlington Golf Course. (At the Earlington site, University of Washington archeologists discovered a prehistoric Duwamish Indian village thought to be between 400 and 1,000 years old.) A total of 59 core samples was taken at the treatment plant site to a depth of 1.8 meters; sample locations are shown in Figure 5-3. None of the 59 cores indicated the presence of subsurface cultural resources. In two of the cores, occasional flecks of charcoal were noted, but these were not considered significant. No stratigraphic bands were observed in any of the samples, and no artifacts were recovered.

Assessment of Impacts. Phase 1 of Alternatives A-3/A-5 calls for expansion of the Renton treatment plant to 72 MGD by 1985; this requires construction of two additional aeration tanks, four secondary clarifiers, and additional disinfection facilities. Phase 2 calls for expansion of the plant to 99 MGD to serve 20-year flows; this requires the additional construction of four primary sedimentation tanks, two aeration tanks, four secondary clarifiers, and disinfection facilities.



SOURCE: METRO, 1981

FIGURE 5-2. RENTON TREATMENT PLANT LAYOUT: RECOMMENDED PROGRAM



SOURCE: UNIVERSITY OF WASHINGTON OFFICE OF PUBLIC ARCHEOLOGY.

FIGURE 5-3. LOCATION OF SUBSURFACE CORINGS AT RENTON TREATMENT PLANT SITE

Construction and site-related impacts of treatment plant expansion are listed and rated in Table 5-1, which also lists mitigation measures to minimize adverse impacts. Land use incompatibility and cultural resource impacts, although potentially the most important of the site-related impacts listed in Table 5-1, do not appear to be major concerns. Land use incompatibility is not a major concern because industrial or railroad uses surround the site. To the east, beyond the drainage channel which borders the site, First City Equities has purchased the Earlington Golf Course and is planning to construct a manufacturing park containing warehouses, businesses, and offices. These uses should also be compatible with the proposed treatment plant improvements, provided that sufficient buffering is maintained between the two properties.

In consultation with the State Historic Preservation Officer (SHPO) and based on the negative results of the cultural resource survey at the Renton treatment plant site, EPA has determined that expansion of the treatment plant will not affect cultural resources. However, it is possible that cultural resources may be present in areas not sampled or below 1.8 meters. If the ground is to be substantially disturbed below 1.8 meters, and if cultural resources are noted, then construction work will be halted and a professional archeologist recommended by the SHPO will be consulted. Subsequent SHPO recommendations will be formally considered. These requirements will be included in an EPA grant condition.

Solids Handling Facilities

Alternatives A-3/A-5 require facilities for anaerobic digestion, gravity thickening, dissolved air flotation, and dewatering. Phase 1 calls for the solids handling facilities to be designed for 72 MGD, and Phase 2 calls for expansion to 99 MGD.

Construction and site-related impacts of the solids handling facilities are listed and rated in Table 5-1, which also lists mitigation measures for adverse impacts. Land use incompatibility and cultural resource impacts are potentially the most important of the impacts listed in Table 5-1. Odors from the solids handling facilities could create conflicts with adjacent land uses (particularly the proposed Earlington manufacturing park), and are identified as a minor adverse impact in Table 5-1; however, the mitigation measures of adequate buffering and odor control technology are capable of mitigating this impact. Cultural resources precautions at the site have been previously reviewed.

This EIS does not consider the site-related impacts of ultimate disposal of sludge from the Renton treatment plant or other Metro treatment plants. These impacts, which are likely to be significant, will be assessed under a separate NEPA process.

Tunnel/Outfall

The Metro Final Wastewater Management Plan defines six alternative tunnel and outfall alignments for the disposal of secondary effluent from the Renton treatment plant. Three of the alternative alignments are in the vicinity of Three Tree Point/Seahurst Park, and three are at Alki Point/Duwamish Head approximately 9.5 miles north of Three Tree Point. The following discussion analyzes the construction impacts of these alternatives; water quality impacts of alternative outfall sites are assessed in Chapter 6 of the EIS.

Description of Existing Environment.

Three Tree Point/Seahurst Park Alternatives. Figure 5-4 depicts the three proposed tunnel/outfall routes in the Three Tree Point area. Two of the alignments, Routes A (Seahurst Park) and B (Lake Burien), would be beneath existing roadways, whereas Route C (Three Tree Point) would be aligned "cross-country", primarily beneath residential land uses.

Table 5-2 shows the land uses along each alignment. The entire area from the Renton treatment plant to Three Tree Point can be broadly classified as residential, with some commercial and transportation (Sea-Tac Airport) uses. Seahurst County Park (Ed Munro Park) is a major recreational area located 2.5 miles north of Three Tree Point (USGS, 1979b).

Preliminary geologic information indicates that the soil materials underlying the Three Tree Point alignments can be classified as a mixture of gravels, soft sandstone, shale and conglomerate; more detailed geological field work would be conducted once the final tunnel route is selected. Topography along the alignments varies from less than 10 feet near the treatment plant to over 400 feet near the Seattle/Tacoma Airport and Three Tree Point

The cultural resources along the alignments are unknown at this time. EPA has developed a grant condition requiring Metro to ensure that a cultural resource survey is completed by a professional archeologist prior to construction. Any subsequent recommendations by the SHPO are to be formally considered.

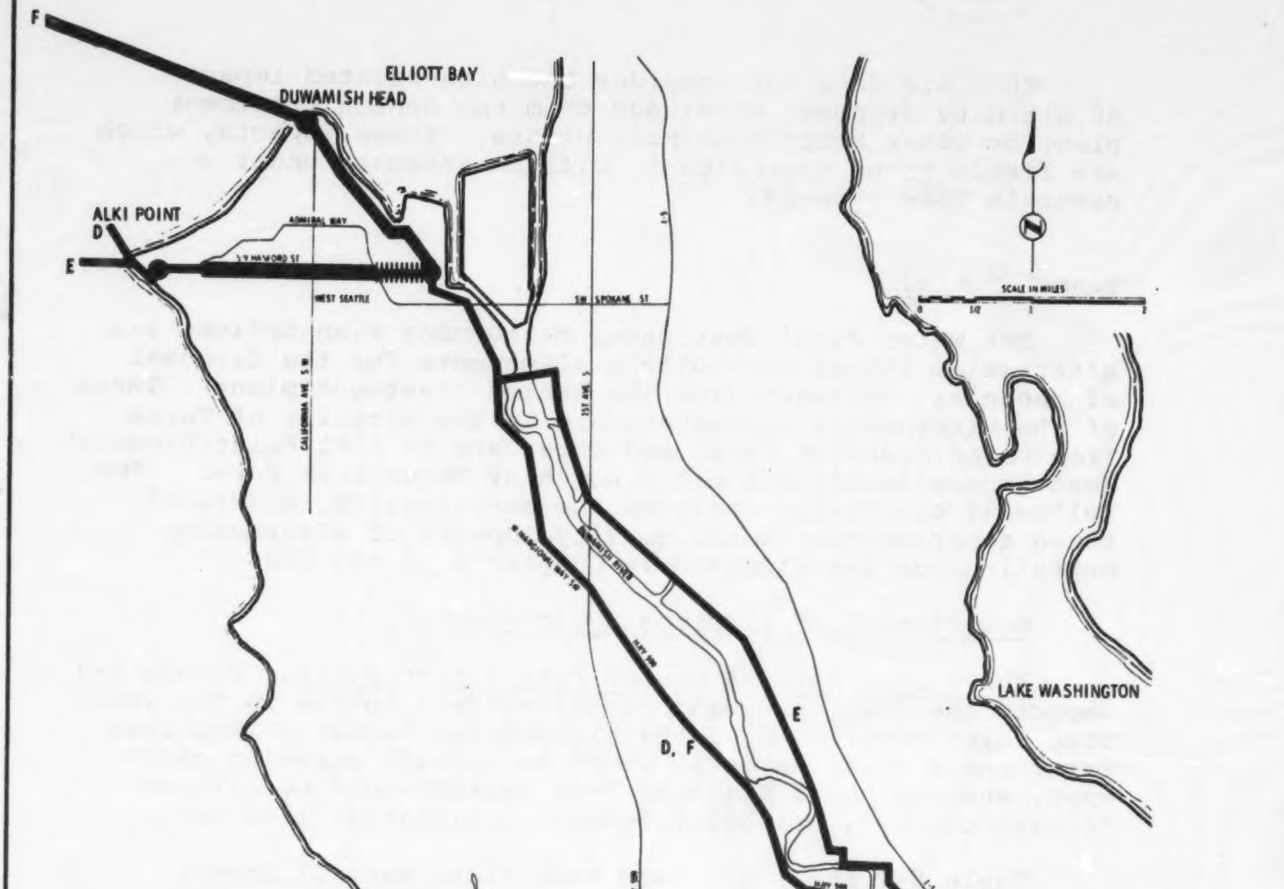


FIGURE 5-4. ALTERNATIVE EFFLUENT DISCHARGE ROUTES

Table 5-2. Existing Land Uses for Tunnel and Open-Cut Alignments

		Route Alternative					
		Three Tree Point			Alki Point		
	Land Use	A	B	C	D	E	F
Tunnel	Residential/Mixed Urban	6,100 ft	5,500 ft	25,000 ft	700 ft	700 ft	-
	Roadway	16,000 ft	19,500 ft	1,200 ft	7,000 ft	7,000 ft	-
	Sea Tac Airport	3,200 ft	4,000 ft	5,500 ft	-	-	-
	Park Land	1,700 ft	-	-	1,500 ft	1,500 ft	-
	Commercial	-	-	1,300 ft	-	-	-
	TOTAL TUNNEL LENGTH	27,000 ft	29,000 ft	33,000 ft	9,200 ft	9,200 ft	-
Open-Cut Construction	Park Land	2,500 ft	Same as Route A		2,500 ft	-	3,380 ft
	Industrial/Transportation	1,500 ft	Same as Route A		51,400 ft[a]	61,100 ft[b]	54,040 ft[c]
	Residential	-	-	-	1,900 ft	1,900 ft	5,280 ft
	TOTAL OPEN-CUT LENGTH	4,000 ft	4,000 ft	4,000 ft	55,800 ft	63,000 ft	62,700 ft
	TOTAL LENGTH OF ALIGNMENT	31,000 ft	33,000 ft	37,000 ft	65,000 ft	72,200 ft	62,700 ft

[a] Route parallels the West Valley Highway (SR 181), West Marginal Way (Rt. 99) and the Burlington Northern Railroad.

[b] Route parallels the Burlington Northern Railroad, East Marginal Way, and Spokane Street.

[c] Route parallels the West Valley Highway (SR 181), West Marginal Way (Rt. 99), the Burlington Northern Railroad, Florida Street, and Harbor Avenue.

Alki Point/Duwamish Head Alternatives. Figure 5-4 shows the three open cut/tunnel alternative routes to Alki Point/ Duwamish Head. Routes D (West Duwamish) and E (East Duwamish) would follow the Duwamish River toward Elliott Bay before turning westward to Alki Point. Route F would follow the Route D alignment from the treatment plant to just north of S.W. Spokane Street; the alignment would continue northward to Florida Street, Harbor Avenue, and then to Duwamish Head and Alki Beach Park. The alignments would follow existing transportation corridors along much of their lengths. Table 5-2 depicts the land uses along each of the alignments.

Most of the existing land use is industrial on both sides of the Duwamish River from the Renton treatment plant north to Spokane Street. Some mixed urban and residential uses occur in the South Park area. Transportation corridors parallel the river on the east (East Marginal Way) and west (West Marginal Way) sides of the Duwamish River. Most of West Seattle is residential, with some scattered areas of commercial and recreational land uses. Land use along the Route F alignment along Harbor Avenue northwest to Duwamish Head, is residential, commercial, and recreation.

The topography and geologic conditions in the West Seattle area are similar to those described for Three Tree Point. Cultural resource studies have not been conducted along the alignments, but would be prior to construction.

Geologic and Seismic Hazards. Soil instability and seismicity risks are hazards which would be encountered along any of the tunnel/outfall alignments. In general, surface soil instability is associated with two potentially hazardous conditions -- erosion hazards, and slide and slippage hazards. Construction in hazardous areas could occur in the vicinity of any of the following three areas: along the open-cut pipeline corridors, adjacent to the tunnel portal areas, and at the pump station site.

Based on King County's mapping of sensitive areas, the proposed pipeline and tunnel alignments do not encounter any designated erosion hazard areas. Slide and slippage (landsliding) hazards, however, do occur along the proposed alignments. King County designates potential landslide hazards based primarily on slope inclination greater than 15 percent. In addition, the physical character of the subsurface material is considered.

The coastal shoreline in the Three Tree Point area has been designated by King County as a moderate-to-serious landslide hazard area, and similar conditions are likely to exist at Alki Point as well, based on slope considerations. Therefore, the design and construction of facilities in the coastal zone, such as the proposed pump station, will have to take landslide hazards into account. Because tunnel portals and the pipeline adjacent to the Duwamish River could also encounter landslide hazard areas, such facilities must be designed and constructed with these factors in mind.

Regarding seismic risks, the entire Puget Sound basin is classified by the U. S. Geological Survey as a Zone 3 seismic risk area indicating high seismic activity. This classification is characterized by a history of major earthquake frequency and associated damage. Several earthquake faults are known to exist within the Puget Sound area including a recently discovered fault which runs through Alki Point. This fault, however, is considered to have been inactive during recent years. A meaningful seismic risk assessment for the tunnel and outfall cannot be made until test borings along the corridor are made during engineering predesign of the project.

Assessment of Construction Impacts. Table 5-1 presents an overview of construction and site-related impacts of tunnel/outfall construction, and lists mitigation measures for adverse impacts. Construction of the tunnel/outfall is estimated to last for approximately 27 months; if the Seahurst Park route is selected, Metro's engineering consultant estimates construction activities at Seahurst Park would last about 18 months, with the full 27 months as a worst-case situation. Different impacts will be associated with the construction of these components of the tunnel/outfall project: force mains or gravity lines, tunnels and pump stations.

The construction of force mains or gravity lines involves a linear open-cut trench and generates impacts typical of surface excavation (e.g., traffic disruption, noise, localized effects on air quality, loss of vegetation). On the other hand, tunneling would result in more localized construction impacts at the tunnel entrances (portals), staging areas, and truck routes; for this assessment, it is assumed that a tunnel boring machine will be used for construction.

Tunneling would also create the need for spoils disposal. Assuming the Seahurst Park route is selected, Metro estimates that 160,000 cubic yards of spoils would be generated, assuming a 13-foot excavation diameter. Metro plans to tunnel from east to west, and dispose of all spoils through the east portal. However, if it becomes necessary, construction could proceed from both ends simultaneously, and spoils could be removed from the west portal as well.

Handling of the spoils involves the basic steps of transport to the tunnel heading, transport from the tunnel heading to the disposal site, and final disposal. Transport to the tunnel heading would be through a "dry" method (preferred) or a "wet" slurry pipeline method. If spoils were in slurry form, a settling pond would be required for the approximately 20 MGD of transport water that would be generated; applicable DOE limits on suspended solids would have to be met prior to disposal of the settling water in either the Green/Duwamish River (east portal) or Puget Sound (west portal). Assuming a 1-day settling time, Metro estimates that about 3 acres would be required for the settling pond. Because site constraints preclude placing a settling pond at the west portal, in the event spoils would be disposed from the west portal, slurry transport of spoils could be used only if barges were employed for settling.

Transport to the final disposal site would be by truck from the east portal; if disposal were to also occur from the west portal, trucks or barges could be used. Metro has identified a number of potential spoils disposal sites, where the spoil can be used for fill, within the vicinity of the east portal; these include the American Can site contiguous to the Renton plant, and the Renton plant itself, which will require over 250,000 cubic yards of fill (more than the total volume produced by tunnelling) to implement the recommended program. If disposal were to occur through the west portal, the spoils could be trucked to a final disposal site or barged to the Tacoma industrial area. If spoils are used as fill for construction sites as planned, impacts at these sites from spoils disposal will be minimal.

Three Tree Point/Seahurst Park Alternatives. The three alternative alignments (Routes A, B, and C) would require approximately 4,000 feet of open-cut construction for force mains, via a common route through Fort Dent Park, across the Duwamish River and the West Valley Highway (State Route 181) to 65th Avenue South. Each of the alternatives would require a new effluent pump station at the Renton treatment plant and a second pump station near each outfall location.

A number of potentially significant adverse impacts are associated with construction of the force main. These consist of: (1) disturbance of the Duwamish River bed and temporary degradation of surface water, (2) disruption of automobile traffic on Interurban Avenue South, (3) noise and dust from excavation and trucking, (4) disruption of recreational use of Fort Dent Park, and (5) potential for encountering archeological resources along the alignment (particularly in Fort Dent Park). Construction of the outfall will result in local mortality of marine benthic organisms.

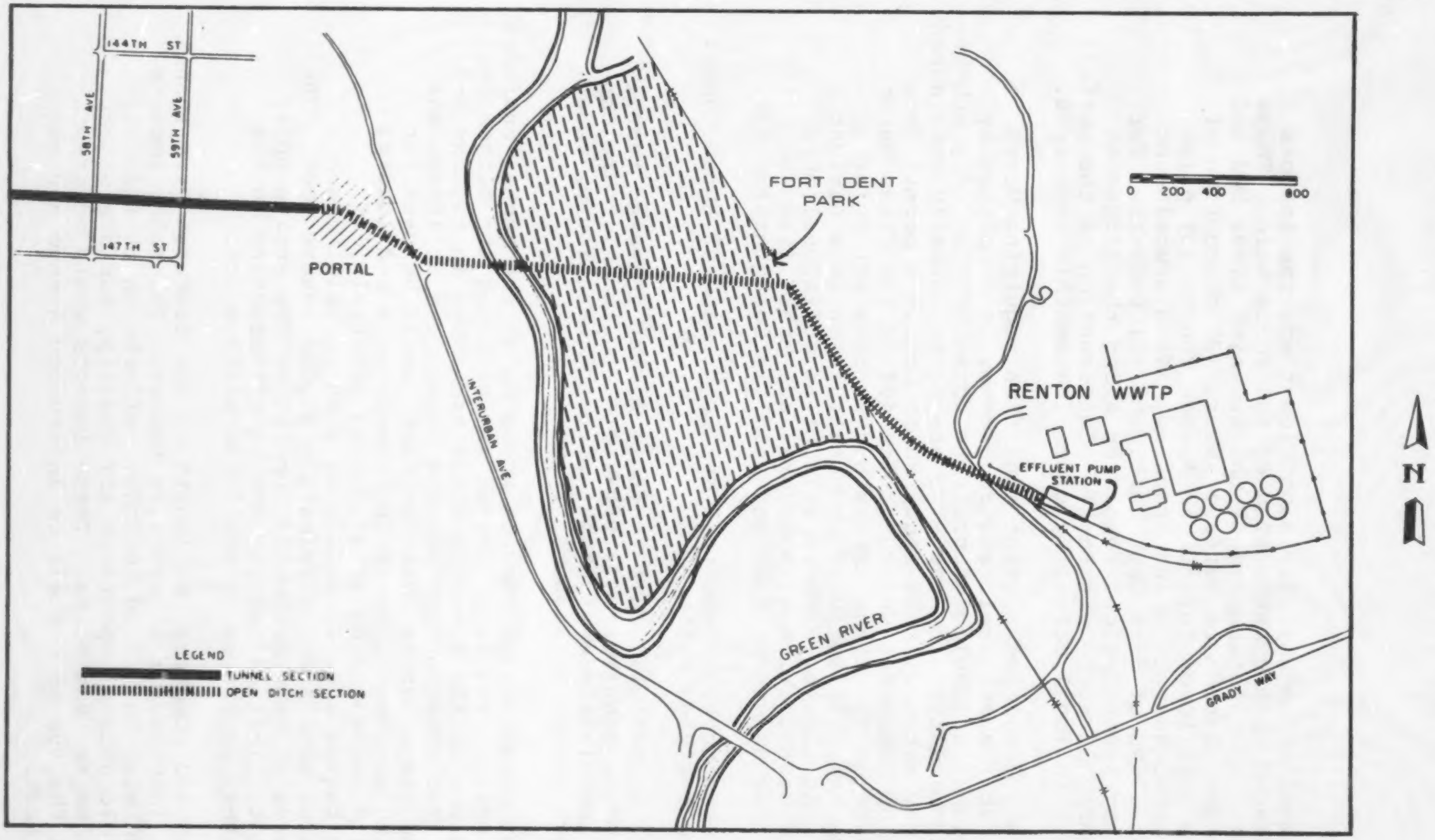
EPA has developed a grant condition requiring Metro to ensure that a cultural resource survey is completed by a professional archeologist prior to construction. Any subsequent recommendations by the SHPO are to be formally considered. In addition, Metro will be required to obtain a permit from the Corps of Engineers under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act prior to any dredge and fill activity or construction in a navigable waterway. At that time there will be an additional opportunity for consultation with federal and state fish and wildlife agencies under the Fish and Wildlife Coordination Act.

The construction impacts specific to each of three tunnel routes are analyzed below.

Route A (Seahurst Park). Route A, the selected tunnel/outfall route, requires a 27,000-foot-long tunnel to be constructed immediately west of Interurban Avenue South, under South 146th Street to Seahurst Park.

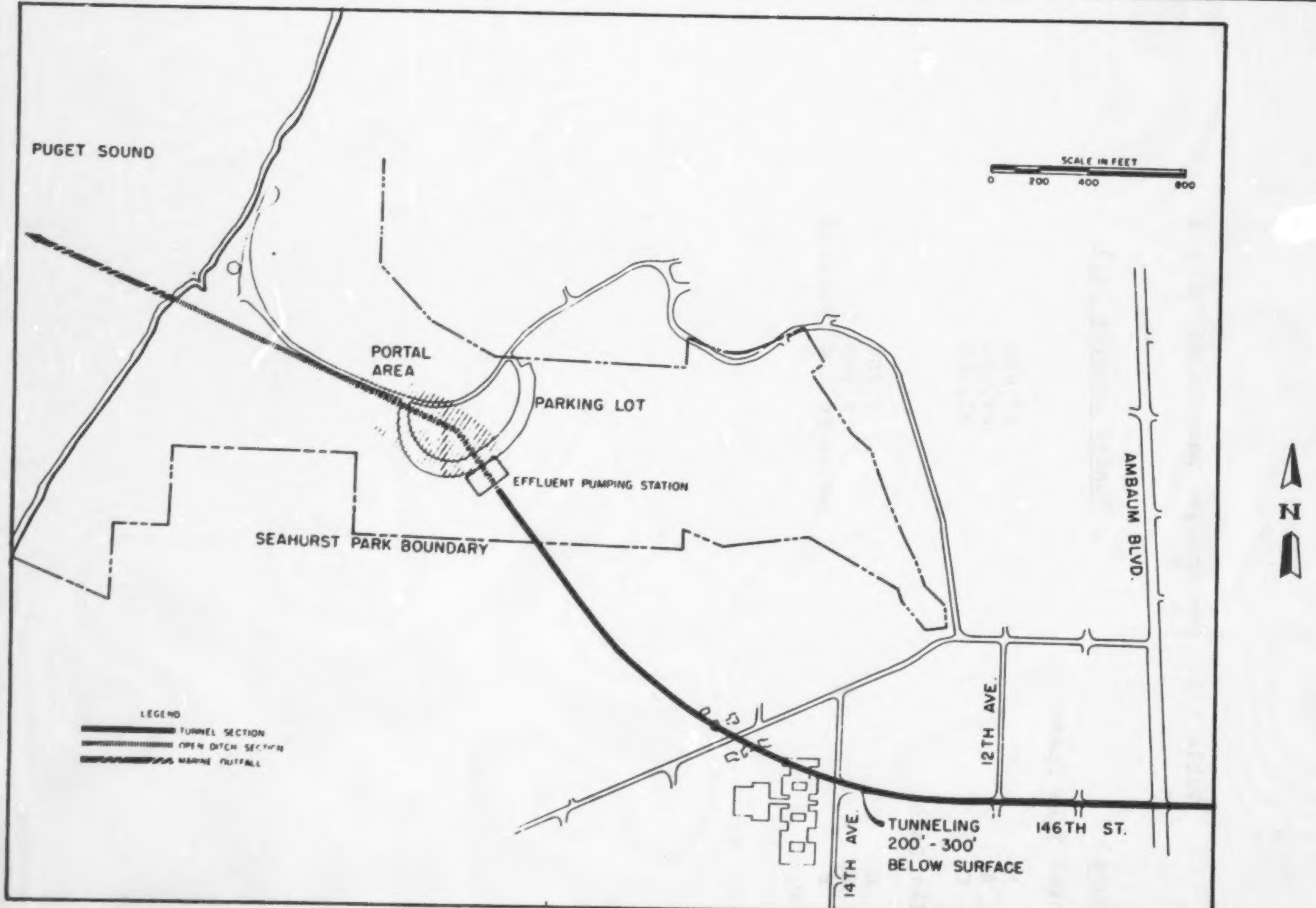
Major construction impacts would be at the tunnel entrance and exit points, and to a limited extent along the alignment. The locations of the tunnel portals are shown in Figures 5-5 and 5-6. Two construction staging areas, one at Interurban Avenue and the other at Seahurst Park, would be used for stockpiling equipment, operating compressors and loading trucks with excavated material (spoil material), if tunneling begins simultaneously at both portals. Each staging area would be approximately 40,000 square feet. The staging area at the park would consist of the entire upper parking lot, limiting parking during construction to the approximately 20 spaces at the lower parking lot.

Table 5-3 compares the length of the Seahurst Park tunnel to tunnel lengths for alternative routes. The major impacts associated with tunneling include: effects on traffic circulation; localized impacts on air quality, surface water, and groundwater; and noise. These impacts would occur primarily at the tunnel portals on Interurban Avenue and at Seahurst Park.



SOURCE: METRO, 1981

FIGURE 5-5. EAST TUNNEL PORTAL



SOURCE: METRO, 1981

FIGURE 5-6. WEST TUNNEL PORTAL

Table 5-3. Comparative Lengths of Tunnels

Route	Tunnel Lengths (ft)
Three Tree Point	
A	27,000
B	29,000
C	33,000
Alki Point	
D	9,200
E	9,200
F	No tunneling required

Traffic and noise impacts would be created by truck traffic at both the east and west tunnel portals. Trucks would be needed to transport construction materials to the staging areas, to remove construction spoils from excavation of the pump station at Seahurst Park (Metro estimates 20-50 truckloads of spoils), and to transport spoils from tunnel excavation (Metro estimates 35 truck trips per day to transport 400 cubic yards of spoils per day). The total volume of spoils is estimated to be 160,000 cubic yards, assuming a 13-foot excavation diameter. The current plan is to dispose of spoils from the east portal only in which case trucks transporting spoils would not affect the Seahurst Park environment. In the event spoils are disposed from the west portal, barges could be loaded with conveyor belts, eliminating truck traffic increases from spoils disposal.

In addition to the tunnel, an underground outfall would need to be constructed from the pump station under the park. A trench as wide as 100 feet would be excavated for this construction. Rerouting of the creek running through Seahurst Park may be required during the outfall construction period. If the creek must be rerouted, short-term adverse effects on fish and other aquatic species using the creek are likely.

Once construction is complete, only the tunnel portal and the pump station would be visible. The tunnel portal would be secluded in a ravine. The pump station would, however, be visible from a portion of the park. It would cover an area of about 10,000 square feet and have a height of up to 20 feet; the pump station would also require road access. A minor hum may be discernible in the immediate vicinity of the pump station, but assuming the superstructure is built with materials providing sufficient insulation, noise from the pump station should not be noticeable by users of Seahurst Park.

The cultural resources along the Route A alignment are unknown at this time. The most sensitive locations will be at the east portal (Interurban Avenue) and at Seahurst Park. More detailed cultural surveys will be scheduled once the alignment is chosen, and SHPO recommendations will be formally considered in accordance with an EPA grant condition. Stability of the ground during tunnel construction should not be a factor because of the deep alignment (maximum depth 450 feet).

Route B (Lake Burien). Route B would include a tunnel portal west of Interurban Avenue, a tunnel alignment beneath S.W. 152nd Street, and a second portal near the Puget Sound shore at the western end of S.W. 152nd Street. Table 5-2 shows the existing land uses for the Route B alignment.

The impacts of Route B tunneling would be similar to those mentioned for Route A. The most sensitive construction areas would be the tunnel portals and staging areas, particularly at the western end of the alignment which would be located in a residential area.

Route C (Three Tree Point). Route C would include a 33,000-foot tunnel "cross-country" from Interurban Avenue to Three Tree Point and tunnel portals at each end of the alignment. Tunneling would be conducted at varying depths under residential areas. Table 5-2 shows the existing land uses for the Route C alignment.

The other impacts of constructing Route C would be similar to those previously mentioned for Route A. The most sensitive locations along this route will be Three Tree Point and Interurban Avenue. Some vibration may be felt by residents located above the alignment, particularly where the depth to the tunnel is shallowest.

Prior to construction of any outfall, Metro would be required to obtain permits from the Corps of Engineers under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act. Metro would also be required to obtain shoreline development permits from King County.

Alki Point/Duwamish Head Alternatives. The three alternate Alki Point routes (Routes D, E, and F) would require 56,000-63,000 feet of open-cut construction for force mains and gravity sewer along the Duwamish River from the Renton treatment plant. Routes D and E would require three pump stations: one at the Renton plant, a second near Harbor Avenue, and a third at Alki Point. The two alignments would have different routes for open-cut construction (east or west side of the Duwamish River) and a common tunnel route from S.W. Admiral Way to Alki Point.

Route F would require two pump stations: one at the Renton plant and the second at Duwamish Head. Route F would be the same as Route D from the Renton plant to a point just north of S.W. Spokane Street. Construction impacts specific to each of the alignments are analyzed below.

Route D (West Duwamish). Route D would require open-cut construction along Interurban Avenue, West Marginal Way S.W., Iowa Avenue S.W., and a short segment of the Burlington Northern Railroad tracks north of Spokane Street. The alignment would parallel existing rights-of-way. Table 5-2 shows the existing land uses for the Route D alignment.

Because of the large size of the gravity sewer and force main, a wide construction trench would be excavated (15 feet or greater). Construction of such a large trench will have significant localized impact wherever the right-of-way is confined by existing structures or utilities.

It is anticipated that there would be a major impact on traffic circulation and use along portions of the heavily travelled alignment.

A preliminary evaluation of cultural resources indicates that there are numerous known archeological sites along the entire length of the Duwamish River, with one particularly large site located on both sides of West Marginal Way, in the vicinity of the proposed pipeline route. A more detailed cultural analysis would be conducted if this alternative were selected, in accordance with EPA grant conditions.

The tunnel alignment for Routes D and E would begin near S.W. Admiral Way, following beneath S.W. Hanford Street, and terminate at a pump station on Alki Point (see Figure 5-4). The portal and staging areas would be the most affected by construction activities. Since the existing land use of the staging and portal areas is primarily residential, construction activities would be particularly intrusive; these impacts would be intensified if trucking of spoil material occurs at Alki Point. Five blocks of open-cut construction along S.W. Admiral Way would occur.

Route E (East Duwamish). The alignment for Route E would follow the Burlington Northern Railroad and East Marginal Way, S.W. to S. Idaho Street, where it would cross the Duwamish River to follow the same alignment as Route D for the remainder of the distance to Alki Point. Much of the open-cut alignment would be constructed through an industrial area and adjacent to Boeing Field. Table 5-2 shows the existing land uses for the Route E alignment. Essentially the same construction impacts may be expected as identified for Route D, except that the river crossing would occur near Kellogg Island instead of at Fort Dent Park; the U. S. Fish and Wildlife Service has identified Kellogg Island as an important wildlife habitat which could be disrupted by construction of the Route E alignment.

Route F (Duwamish Head). The construction impacts associated with Route F from the Renton plant to a point north of Spokane Street (along the Burlington Northern Railroad tracks) would be identical to those described for Route D. Table 5-2 shows the existing land uses along Route F.

From the Burlington Northern Railroad to the point of outfall, Route F would follow a portion of Florida Street and Harbor Avenue to Duwamish Head and Alki Beach Park. Construction in the roadways, particularly along Harbor Avenue, would affect traffic circulation. Access to Alki Beach Park from Firmount Avenue S.W. to S.W. California Place may also be affected when construction occurs along that portion of the alignment.

Land would be required for construction of outfall pump stations in Alki Beach Park, probably at the northernmost point of Duwamish Head.

The status of cultural resources along the alignment is not known. Detailed cultural surveys of the alignment would be required if this route were selected. Any recommendations of the SHPO would be considered, in accordance with EPA grant conditions.

For this and all Alki alignments, Metro would be required to obtain a permit from the Corps of Engineers under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act for any dredge and fill activity or structures in navigable waterways. Metro would also have to obtain a shoreline development permit from the City of Seattle.

Summary of Major Construction and Site-Related Impacts of Final Plan Recommended Program and Mitigation Measures

If the final plan recommended program is implemented, a decision on the Redmond and North Creek/Hollywood connections would be deferred. Construction impacts from the present decision would be limited to the Renton treatment plant site and the tunnel/outfall route for Seahurst Park. Table 5-4 summarizes major impacts that would occur at these locations, based on the preceding analyses, and lists available mitigation measures. As shown in Table 5-4, if the recommended program is implemented, Seahurst Park would be the area of greatest impact.

Table 5-4. Summary of Major Construction/Site Impacts and Available Mitigation Measures for Final Plan Recommended Program

Geologic and seismic hazards: Soil instability and seismic hazards could be encountered along tunnel/outfall route.	1) Metro-proposed detailed engineering and geotechnical studies should include: a. Identification of areas of soil instability along route, and siting of facilities or development of construction methods to reduce soil instability hazards. b. Assessment of seismic hazards based on borings and site-specific seismic investigations, and development of project design to reduce seismic risks to acceptable levels. c. Evaluation of Seahurst Park route, based on engineering and geologic studies, from the standpoint of cost, engineering, and risk. 2) If Seahurst Park route not feasible, and another route selected, supplements to Final Wastewater Management Plan and EIS should be prepared.
Spoils transport and disposal impacts: Traffic and potential water quality impacts.	1) Preparation of a final spoils disposal plan. 2) Compliance with DOE limits for sediment discharge if wet transport is used.
Cultural resources: Archeological remains could be encountered along tunnel/outfall route.	1) Conduct detailed archeological survey of tunnel/outfall route prior to construction, and consult with SHPO.
Recreation: Disruption of recreational uses of Seahurst Park.	1) Scheduling construction activities during off-peak recreation periods to the extent practicable. 2) Preparation of a construction plan to establish detailed procedures to reduce recreation use impacts.
Traffic: Increased truck traffic at Renton plant and tunnel portals during construction.	1) Rerouting traffic around construction sites and providing flagmen to ensure traffic safety.
Water quality: Potential rerouting of Seahurst Park creek during construction.	1) Siting of outfall to avoid necessity for rerouting of creek. If creek must be rerouted, rerouting should occur during summer months, when impacts on aquatic life would be least. 2) Preparation of a rehabilitation plan to ensure prompt restoration.
Aesthetics: Pump station at Seahurst Park would be incompatible with natural park setting.	1) Selection of building design and materials to minimize visual impacts.

Impacts of Alternative A-1

Differences from Alternatives A-3/A-5

Alternative A-1 includes construction of the following components, which are also required for Alternatives A-3/A-5: Redmond connection, North Creek/Hollywood connection, Renton treatment plant expansion and solids handling facilities. Impacts of constructing these components have been previously reviewed.

Alternative A-1 differs from Alternatives A-3/A-5 in the following respects:

- Nitrification facilities would be constructed at the Renton treatment plant site.
- Solids handling facilities could not be accommodated on site, and an additional 19 acres would be purchased.
- A tunnel and outfall would not be required.

Thus, compared to Alternatives A-3/A-5, construction impacts at the Renton treatment plant site would be intensified, but impacts associated with tunnel and outfall construction would be avoided. Impacts of the nitrification facilities and of the additional land required for solids handling are reviewed below.

Nitrification Facilities

Nitrification facilities would be constructed at the Renton treatment plant site (see Figure 5-7), whose existing environment has been previously reviewed. Construction impacts of the nitrification and mitigation measures are listed in Table 5-1; these are similar to the impacts of treatment plant expansion under Alternatives A-3/A-5 previously described.

Additional Land Required for Solids Handling Facilities

The preferred site for the additional 19 acres required for solids handling under Alternative A-1 is shown in Figure 5-7. The need for purchase of an additional 19 acres is an adverse impact of Alternative A-1 not shared by the Alternatives A-3/A-5.

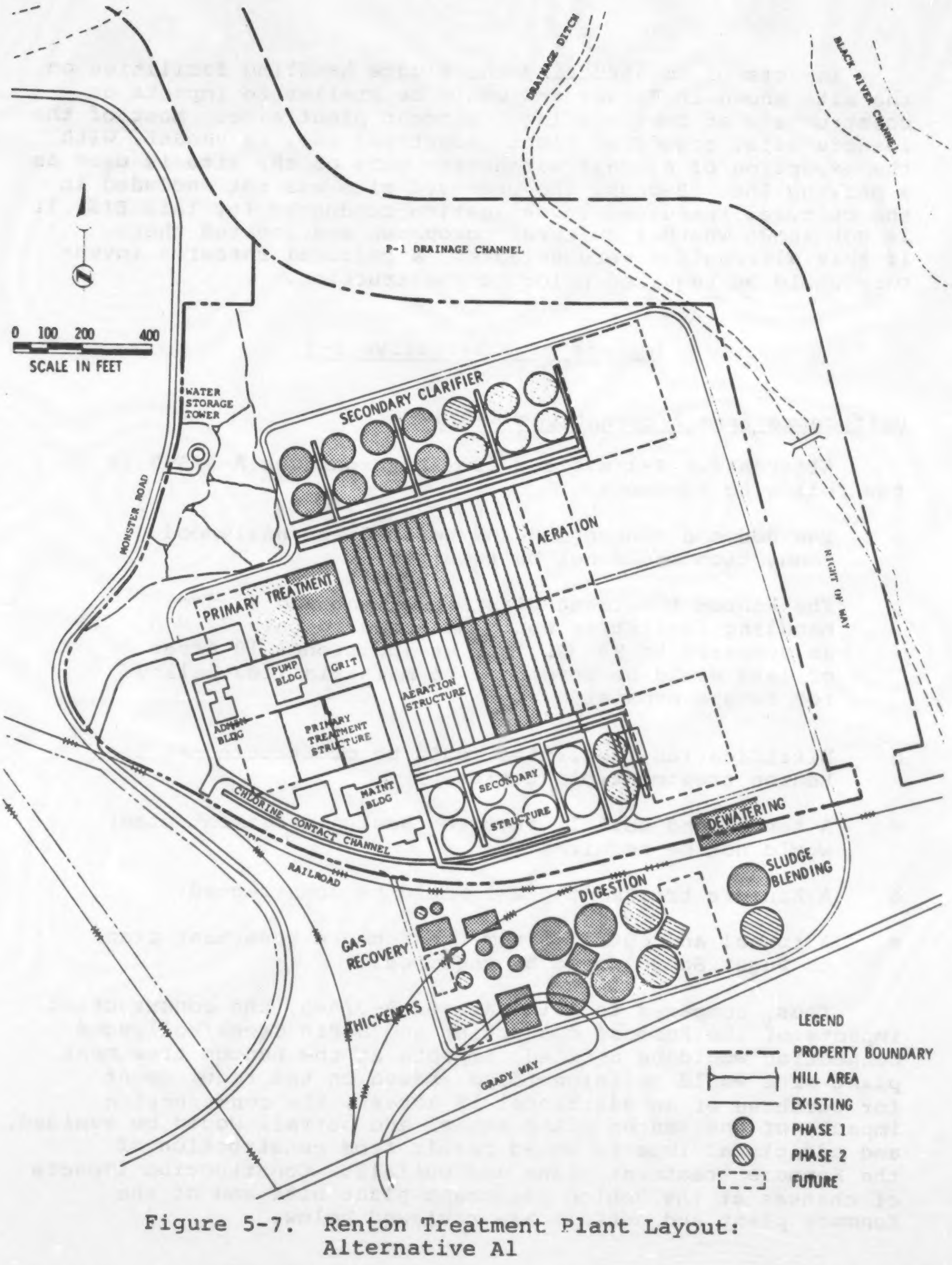


Figure 5-7. Renton Treatment Plant Layout: Alternative A1

SOURCE: Metro, 1980g.

Impacts of constructing the sludge handling facilities on the site shown in Figure 5-7 would be similar to impacts on construction at the existing treatment plant site. Most of the 19-acre site, zoned for light industrial use, is vacant, with the exception of a small warehouse; part of the site is used as a parking lot. Because the proposed site was not included in the cultural resources investigation conducted for this EIS, it is not known whether cultural resources are located there. If this alternative were selected, a cultural resource inventory would be required prior to construction.

Impacts of Alternative B-1

Difference from Alternatives A-3/A-5

Alternative B-1 differs from Alternatives A-3/A-5 in the following respects:

- The Redmond connection and North Creek/Hollywood connection would not be required.
- The Renton treatment plant treatment and sludge handling facilities would be sized to only 72 MGD, as compared to 99 MGD, but an additional 19 acres of land would be purchased to maintain flexibility for future expansion.
- Nitrification facilities would be constructed at the Renton treatment plant site.
- A tunnel and outfall from the Renton treatment plant would not be required.
- A Kenmore treatment plant would be constructed.
- A tunnel and outfall from the Kenmore treatment plant to Puget Sound would be required.

Thus, compared to Alternatives A-3/A-5, the construction impacts of the Redmond connection and North Creek/Hollywood connection would be avoided, impacts at the Renton treatment plant site would be intensified (based on the requirement for purchase of an additional 19 acres), the construction impacts of the Renton plant tunnel and outfall would be avoided, and additional impacts would result from construction of the Kenmore treatment plant and outfall. Construction impacts of changes at the Renton treatment plant site and of the Kenmore plant and outfall are reviewed below.

Changes at the Renton Treatment Plant Site

Under Alternative B-1, the Renton treatment plant would be sized to 72 MGD, and nitrification facilities would be constructed. Impacts of constructing the facilities at the Renton plant site required for Alternative B-1 are similar to those previously described for Alternatives A-3/A-5 and Alternative A-1. The need for purchase of an additional 19 acres is an adverse impact of Alternative B-1 not shared by the preferred program.

Kenmore Treatment Plant

No site has been selected for the Kenmore treatment plant. Additional site-specific environmental impact analysis would therefore be required if Alternative B-1 is selected. A Kenmore treatment plant would require about 19 acres for the 27 MGD capacity planned for Phase 2. Purchase of a 40-acre site has been proposed. The proposed layout for a Kenmore treatment plant is illustrated in Figure 5-8.

Construction and site-related impacts of a Kenmore treatment plant are listed and rated in Table 5-1, which also lists mitigation measures to minimize adverse impacts. Land use incompatibility and cultural resource impacts are potentially the most important of the impacts listed in Table 5-1. Neither can be fully assessed until specific sites for the Kenmore treatment plant are identified. Land use incompatibility may be a major factor because suitable industrial sites within the Kenmore area are limited.

Kenmore Treatment Plant Outfall

Alternative B-1 would include as a project feature an outfall tunnel from the Kenmore treatment plant to a point of discharge south of Richmond Beach County Park. Two alternative alignments have been proposed: Route A, beneath N.E. 185th Street, and Route B, beneath N.E. 175th Street. Both alignments would originate near Bothell Way (State Route 522).

The alignments would be located beneath existing roadways for much of their lengths. Existing land use on both sides of the roadways is primarily residential, with some commercial and service-related uses. Land use along Bothell Way is also a mix of residential and commercial. Richmond Beach County Park is a popular recreation area, as is Log Boom Park on Lake Washington (proposed site of a pump station).

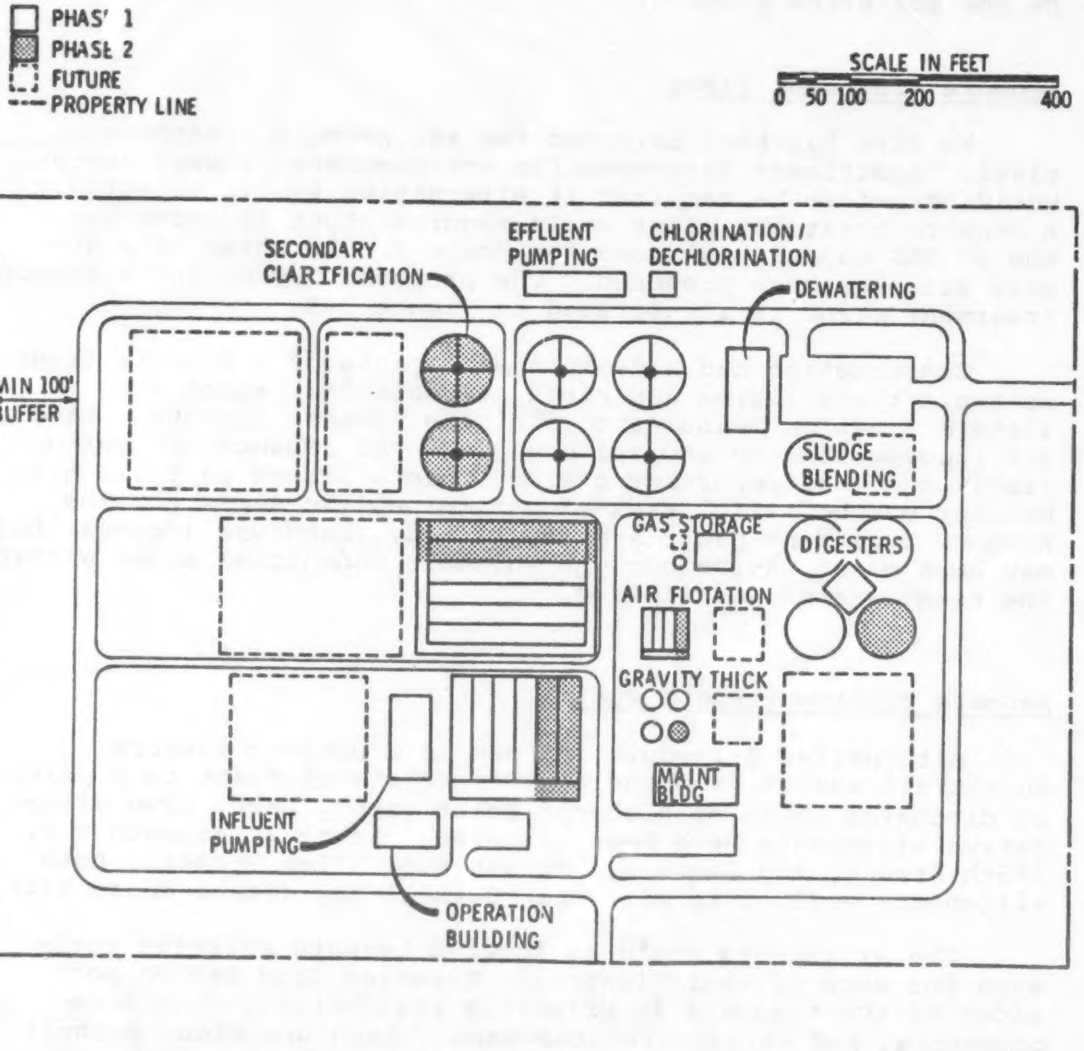


Figure 5-8. Kenmore Treatment Plant Schematic: Alternative B1 (Conceptual 40-Acre Site)

SOURCE: Metro, 1980g.

Impacts of constructing force mains and tunnels to the outfall site near Richmond Beach would be similar to those defined for the tunnel alternatives to Point Pulley and Alki Point; see Table 5-1 for a summary of impacts and mitigation measures. Since neither of the tunnel alignments for this alternative has been clearly defined, a detailed analysis of construction impacts is not possible at this time. The most significant construction impacts would include noise (from tunneling and staging activities), spoil disposal of materials excavated from the tunnel, and disruption of recreation uses at Richmond Beach.

Construction Employment Impacts

Each of the final alternatives would be a major capital project, and consequently would employ a significant number of construction workers. The total construction costs of the alternatives range from $262,200,000 (Alternative A-1) to $409,900,000 (Alternative A-5). Of the total construction costs, between $112,200,000 and $243,400,000 would be spent on labor.

The number of jobs created by this labor expenditure may be estimated by considering the average hourly wage and the average number of hours worked in a year by a fully-employed construction worker. As shown in Table 5-5, the expenditure on labor may thus be expected to create between 4,050 and 8,770 total person-years of employment. Based on similar calculations, the final plan recommended program would require 3,384 person-years of employment. The number of jobs actually created depends on the duration of construction; for example, if construction lasts 1 year, then for Alternatives A-3/A-5 4,050-8,770 workers would be needed at one time, but if it lasts 2 years, then only half that number, 2,025-4,385, would be needed.

Because each alternative would be constructed in two phases, however, these jobs will not be created at the same time. Table 5-6 summarizes the employment effects of each alternative by phase. It shows, for example, that Alternative A-5 would create 7,480 job-years of employment in Phase 1 but only 1,290 in Phase 2. The number of people actually employed would, again, vary with the duration of the construction project as discussed above and shown in the table.

This analysis indicates that Metro's plan will create a large demand for construction workers. Because of the relatively large size of the construction labor force in the Seattle area, however, there will probably be little need for construction workers to temporarily move to the Seattle area to build the projects called for in the plan.

Table 5-5. Total Employment Impacts of Project Alternatives

	Alternative			
	A1	A3	A5	B1
Total construction cost	$262,200,000	$309,800,000[a]	$409,900,000[a]	$322,600,000[a]
Labor cost[b]	112,200,000	174,400,000	243,400,000	151,400,000
Hours of work[c]	7,480,000	11,626,667	16,226,667	10,093,333
Job years[d]	4,050	6,290	8,770	5,450
Number of jobs if construction lasts:				
1 year	4,050	6,290	8,770	5,450
2 years	2,025	3,145	4,385	2,725
3 years	1,350	2,100	2,920	1,820
5 years	810	1,260	1,750	1,090

Note: Figures may be slightly inconsistent because of rounding.

[a] More than one outfall/tunnel alignment is under consideration, and no preferred alternative has been identified. Therefore, this estimate includes the least cost alternative.
[b] Based on U. S. Environmental Protection Agency Construction Cost Indexes for Urban Sewers, Seattle, Washington, third quarter, 1979.
[c] Average hourly compensation (wage plus fringe) of $15.00.
[d] Average work year of 1,850 hours (37 hours per week, 52 weeks per year).

Source: David L. Clark, Associate Engineer, Brown and Caldwell, letter to Gruen Gruen + Associates, June 26, 1980; Washington, State of, Department of Labor and Industries, pers. comm. to Gruen Gruen + Associates, June 1980; U. S. Department of Labor, *Monthly Labor Review*, March 1980 (Table 14); Gruen Gruen + Associates.

Table 5-6. Employment Impacts of Project Alternatives, by Phase

	Alternative A1		Alternative A3		Alternative A5		Alternative B1	
	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2	Phase 1	Phase 2
Total construction cost	$164,100,000	$98,100,000	$233,800,000[a]	$76,000,000	$333,900,000[a]	$76,000,000	$294,800,000[a]	$27,800,000
Labor cost[b]	67,900,000	44,300,000	138,800,000	35,700,000	207,700,000	35,700,000	140,500,000	10,800,000
Hours of work[c]	4,526,666	2,953,333	9,253,333	2,380,000	13,846,667	2,380,000	9,366,667	720,000
Job years[d]	2,450	1,600	5,000	1,290	7,480	1,290	5,060	390
Number of jobs if construction duration is:								
1 year	2,450	1,600	5,000	1,290	7,480	1,290	5,060	390
2 years	1,225	800	2,500	645	3,740	645	2,530	195
3 years	820	530	1,670	430	2,490	430	1,690	130
5 years	490	320	1,000	260	1,500	260	1,010	80

[a] More than one outfall tunnel alignment is under consideration; cost estimate included here is for the lowest cost alternative.

[b] Based on U. S. Environmental Protection Agency Construction Cost Indexes for Urban Sewers, Seattle, Washington, third quarter, 1979.

[c] Average hourly compensation (wage plus fringe) of $15.00.

[d] Average work year of 1,850 hours (37 hours per week, 50 weeks per year).

Source: David L. Clark, Associate Engineer, Brown and Caldwell, letter to Gruen Gruen + Associates, June 26, 1980; Washington, State of, Department of Labor and Industries, pers. comm. to Gruen Gruen + Associates, June 1980; U. S. Department of Labor, *Monthly Labor Review*, March 1980 (Table 14); Gruen Gruen + Associates.

Chapter 6

OPERATIONAL IMPACTS OF ALTERNATIVES

Introduction

This chapter describes the operational impacts of the long-term wastewater management alternatives for the Lake Washington/Green River Basins. The alternatives considered are Alternatives A-3/A-5, Alternative A-1, Alternative B-1, and no project. Separate sections cover impacts and mitigation measures for water quality, aquatic biology, and fisheries; resource use; growth-related impacts related to project staging; and recreation.

Under the recommended program in Metro's Final Plan, capacity would be provided to treat 72 MGD by the year 2000, rather than the 99 MGD capacity provided by Alternatives A-3/A-5 in the Draft Plan. Operational impacts which depend upon effluent volume would be reduced under the recommended program, as compared to Alternatives A-3/A-5. The operational impacts described in this chapter for Alternatives A-3/A-5 thus represent "worst-case" impacts that would result if a decision is subsequently made to divert flows from the north part of the study area to the Renton plant. It is anticipated that the difference between 72 MGD and 99 MGD will not result in significantly different water quality impacts.

Most of the growth-related impacts associated with the long-term alternatives are common to all the alternatives. These growth-related impacts are covered in Chapter 7 of the EIS.

Water Quality, Aquatic Biology, and Fisheries

Introduction

This section describes the direct impacts of project alternatives on the Green/Duwamish River and Puget Sound. Water quality impacts are discussed first, followed by biological and fisheries impacts. For detailed background information on the existing water quality and biological conditions of the Green/Duwamish River and Puget Sound, the reader is referred to Appendix C in the separately bound appendices to this EIS.

The basis for predicting impacts on the Green/Duwamish River is existing knowledge of the effects of the Renton discharge on the river, extrapolated to future conditions of effluent flow and quality. The "extrapolation" process ranges in complexity from qualitative estimates to computer modeling performed by the Washington Department of Ecology (DOE).

Much of the basis for predicting impacts on Puget Sound is the knowledge of the effects of Metro's West Point discharge on the sound. Much of this knowledge was derived from a series of Metro-sponsored studies conducted from about 1973-1977, the Puget Sound Interim Studies (summarized in Duxbury, 1976). Also considered are local conditions near the alternative proposed outfall sites and the potential cumulative impacts on Puget Sound of the Renton discharge and other discharges.

The effects of the West Point discharge can reasonably be used to evaluate the effects of Renton discharge locations on Puget Sound if the proper qualifications are made to account for differences in effluent flow and quality, and differences in current and circulation patterns at the different discharge locations. Effluent flow at West Point was about 120 MGD when the Puget Sound Interim Studies were performed, and treatment consisted (as it does presently) of only primary treatment. Effluent flow from a Renton discharge to Puget Sound would be about 100 MGD in the year 2000, and treatment would be secondary. Differences in currents and circulation patterns between West Point and the alternative Renton discharge locations are obviously important in using the West Point discharge as a model for a Renton-Puget Sound discharge; these differences are considered in this EIS.

Water Quality

Background. The following discussion summarizes the water quality conditions of Puget Sound and the lower Green/Duwamish River, and the effects of present treated sewage discharges.

Although this section focuses on potential adverse impacts of the alternatives on either Puget Sound or the Green/Duwamish River, it should be noted that all the alternatives, except the no-project alternative, will result in improved effluent quality at the West Point treatment plant. All project alternatives include construction of solids handling facilities at the Renton plant, eliminating the current practices of transporting solids to the West Point plant, where the solids cause dry season violations of the plant's NPDES permit limitations for suspended solids.

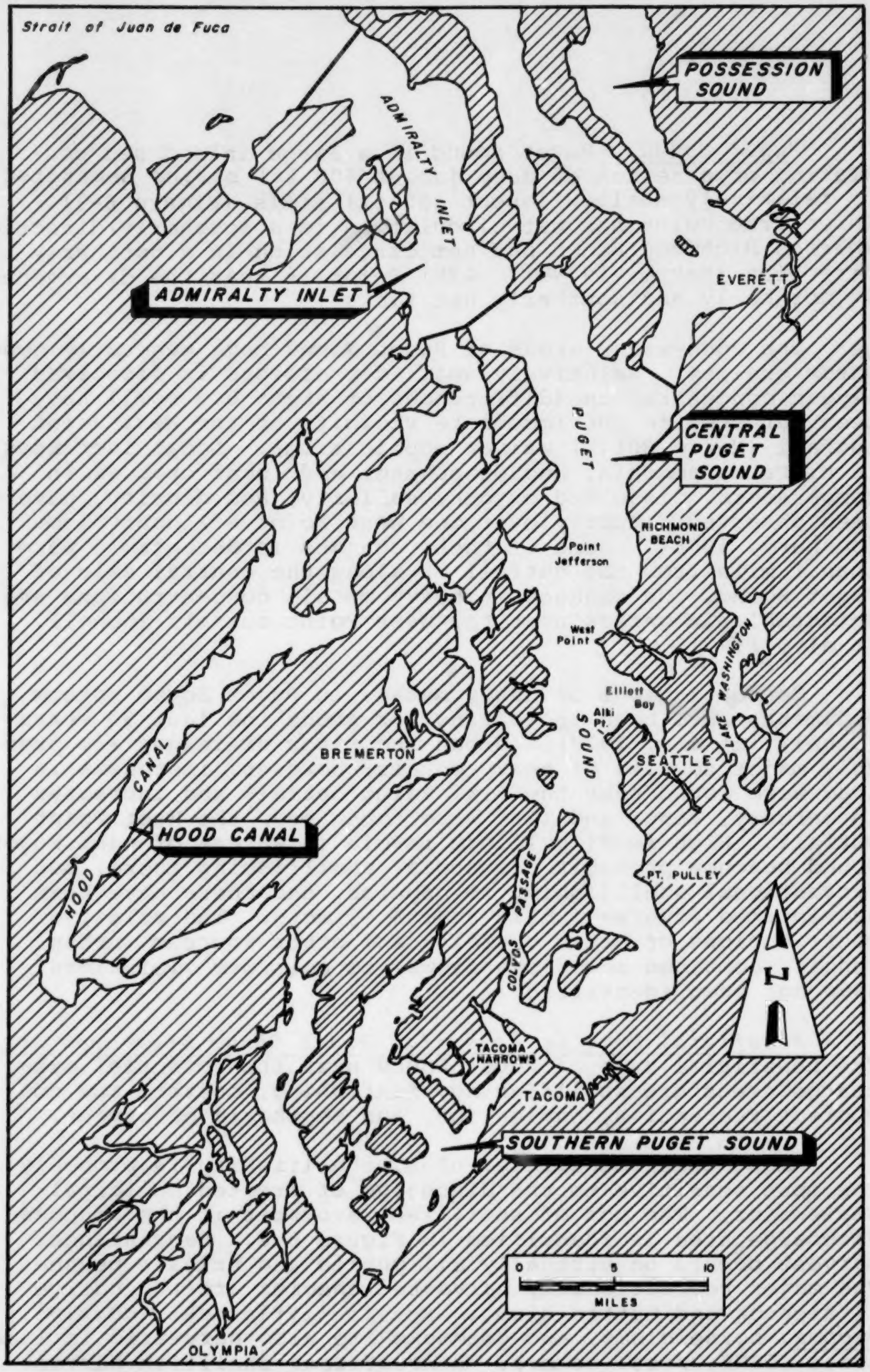
Puget Sound. Puget Sound is a large inland sea consisting of a series of deep (about 600 ft) basins separated by relatively shallow (about 150 ft) sills (Figure 6-1). Three Tree Point has net circulation in a southerly direction, whereas Richmond Beach has net circulation in a northerly direction (Metro, 1979e). Alki Point is near the divergence of northerly and southerly net flows.

The open-water areas of Puget Sound have generally good water quality. Relatively small depressions in dissolved oxygen concentration (differences of about 0.3 mg/l) have been detected in the immediate vicinity of the West Point outfall (Metro 301(h) waiver application). Local increases in nitrate, ammonia, and phosphate, and local changes in temperature, dissolved oxygen, salinity, and density, have been observed directly over the West Point effluent plume (Duxbury, 1976). None of these changes is detectable more than 1 mile from the outfall or along the central axis of Puget Sound. No changes in heavy metals concentrations are detectable in waters near the West Point outfall (Schell, et al., 1977).

Concentrations of heavy metals in Puget Sound bottom sediments have been increasing for about the last 50 years (Schell, et al., 1977). Urban and river drainages are probably major sources of heavy metals; however, increases in lead were found near the Alki Point outfall and increases in mercury, zinc, and lead were found near the West Point outfall. High fecal coliform levels in waters of east Puget Sound beaches prohibit commercial shellfishing there, but recreational shellfishing is popular, and there have been no reported adverse public health effects. The relative contributions of Metro outfalls and other sources (urban runoff, combined sewer overflows) to coliform violations have not been identified.

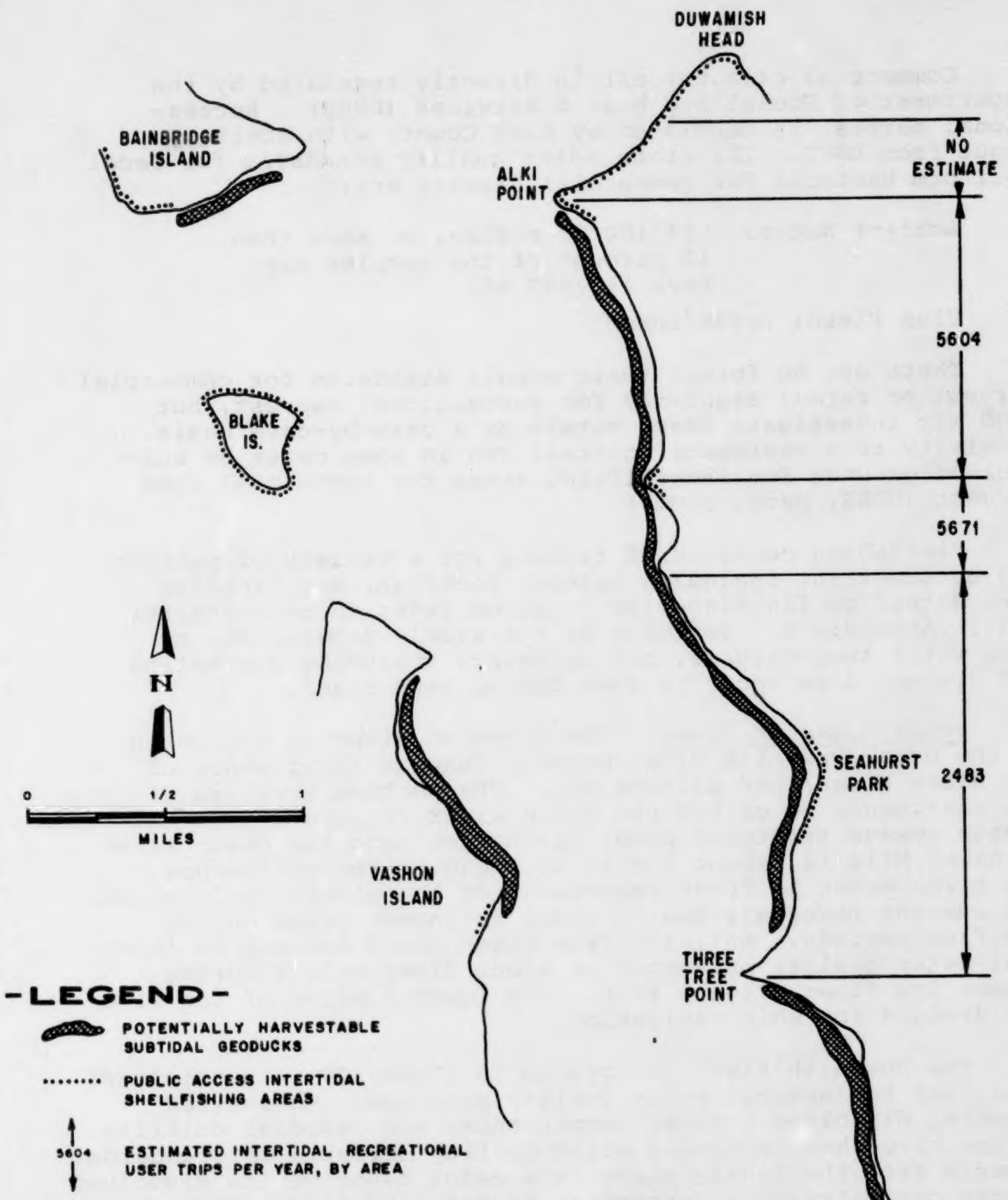
Beneficial Uses in Potential Puget Sound Discharge Areas. The beneficial uses of Puget Sound near the potential discharge areas are shellfishing, finfishing, contact and noncontact recreation, navigation, and aesthetic enjoyment.

Among these beneficial uses, shellfishing is probably the most sensitive to the discharge of treated municipal wastewater. The use of shellfish resources in the proposed discharge area is identified in Figure 6-2. Recreational harvest occurs on virtually all public and private beaches. The major recreationally harvested species are the native littleneck and butter clams. Manila littlenecks, cockles, Macoma, horse clams, and geoducks are also harvested in local areas (DSHS, pers. comm.). Recreational shellfish harvest occurs year-round, except for occasional closures due to paralytic shellfish poisoning. Subtidal geoduck beds that are of potential commercial harvest value are widely found.



SOURCE: DUXBURY, 1976

FIGURE 6-1. SUBDIVISIONS OF PUGET SOUND


DUWAMISH HEAD
BAINBRIDGE ISLAND
NO ESTIMATE
ALKI POINT
5604
BLAKE IS.
5671
N
SEAHURST PARK
2483
0
1/2
1
MILES
VASHON ISLAND
THREE TREE POINT
-LEGEND-
POTENTIALLY HARVESTABLE SUBTIDAL GEODUCKS
PUBLIC ACCESS INTERTIDAL SHELLFISHING AREAS
5604
ESTIMATED INTERTIDAL RECREATIONAL USER TRIPS PER YEAR, BY AREA

SOURCES: GOODWIN 1978, SCHOLZ PERS COMM, DEPT. OF FISHERIES 1978

FIGURE 6-2. SHELLFISH RESOURCES NEAR POTENTIAL DISCHARGE AREAS

Commercial clam harvest is directly regulated by the Department of Social and Health Services (DSHS). Recreational harvest is regulated by King County with advisory input from DSHS. The state water quality standards for fecal coliform bacteria for commercial harvest are:

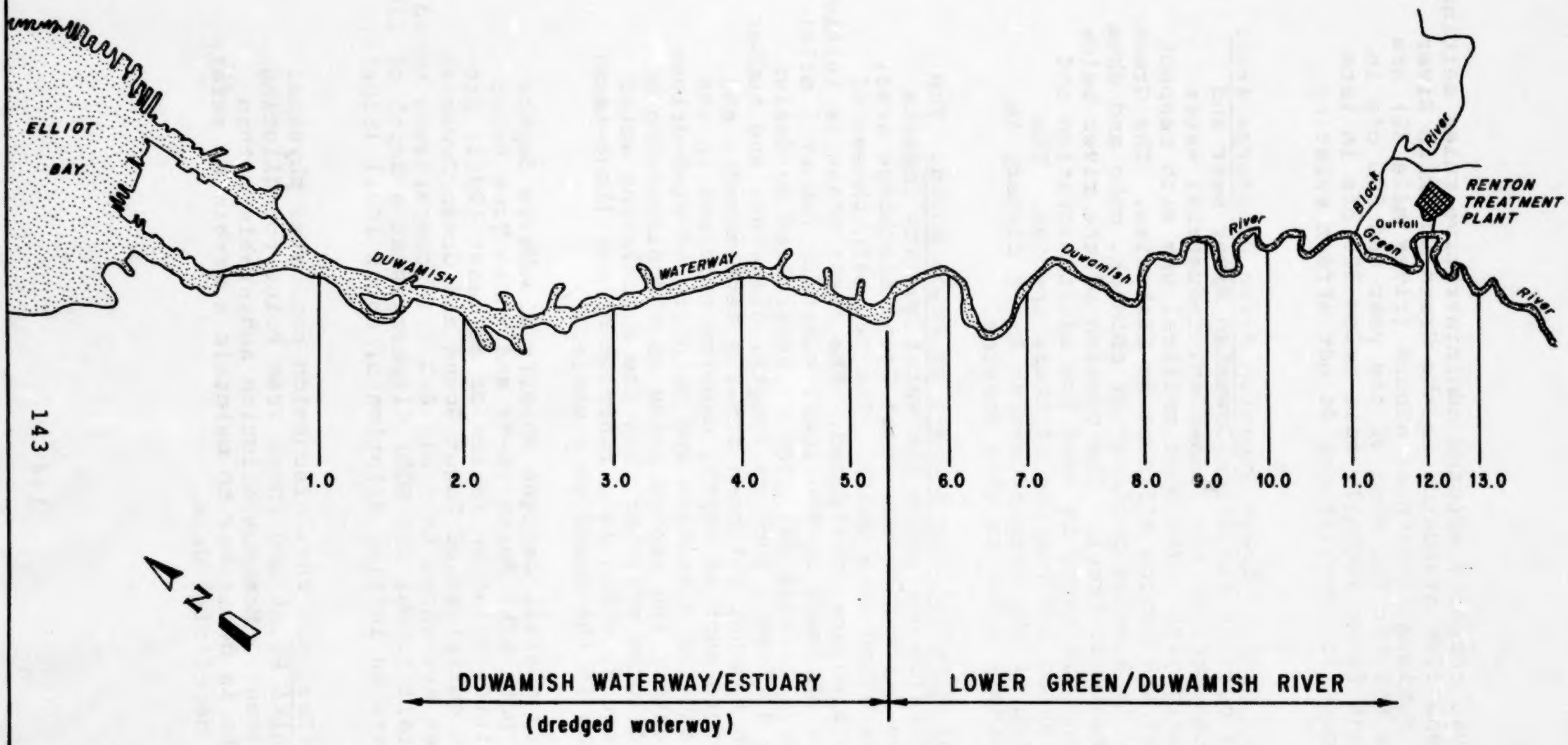
Ambient Water:	<14/100 ml median; no more than 10 percent of the samples may have >43/100 ml.
Clam Flesh:	<230/100 g

There are no formal toxic metals standards for commercial harvest or formal standards for recreational harvest, but DSHS may investigate heavy metals on a case-by-case basis. Proximity to a wastewater outfall can in some cases be sufficient grounds for decertifying areas for commercial clam harvest (DSHS, pers. comm.).

Finfishing consists of fishing for a variety of pelagic and bottom fish, including salmon, rockfish, and flatfish. More detail on fin fisheries is given later in this chapter and in Appendix C. Swimming is not widely popular due to cool water temperatures, but swimming, including snorkeling and diving, does occur to some degree year-round.

Green/Duwamish River. The Duwamish River is the reach of the Green/Duwamish River between Tukwila (confluence of the Black River) and Elliott Bay. The portion upstream of the confluence is called the Green River (Figure 6-3). The Renton sewage treatment plant discharges into the Green River at River Mile 12, about 1 mile upstream of the confluence. The river water is fresh year-round at the discharge location, but current reversals due to tidal influence occur during low flow periods. Salinity from Puget Sound becomes an important water quality parameter at about River Mile 6 during summer low flows (Figure 6-3). The lower 5 miles of the river are dredged for ship navigation.

The Duwamish River is located in a heavily industrialized area, and has several water quality problems. Un-ionized ammonia, dissolved oxygen, temperature, and residual chlorine in the river have exceeded water quality criteria or standards. Ammonia from the Renton plant is a major cause of low dissolved oxygen concentrations, according to modeling studies (Yake, 1980). The temperature of the Renton effluent increases the frequency of violations of temperature standards in the river. Although coliform bacteria standards are violated frequently, Renton effluent does not appear to be implicated (Bernhardt, 1980). Polychlorinated biphenyls (PCBs) are present in high concentrations in Duwamish River sediments, particularly near the mouth of the west waterway (Metro, 1979e). The Renton plant is not a major contributor of PCBs.



SOURCE: YAKE, 1980

FIGURE 6-3. LOWER GREEN-DUWAMISH RIVER WITH RIVER MILE INDEX

The DOE has recently adopted administrative rules setting minimum instream flow standards in the Green/Duwamish River (DOE, 1980). Minimum flows near Auburn (river mile 32) are proposed to be 650 cfs for most of the year and 300 cfs in summer. Present flows actually fall below 300 cfs in late summer. Minimum flow regulations do not affect existing water rights.

Beneficial Uses of Green/Duwamish River Discharge Area. The beneficial uses of the Green/Duwamish River near and below the Renton outfall are fisheries, industrial water supply, and navigation. The most critical use with respect to discharge of the Renton effluent is fisheries. The Green/Duwamish River is a major producer of chinook, coho and chum salmon, and steelhead trout. The portion of the river below the Renton plant discharge is used for adult migration and juvenile migration and rearing of these species. The nature and value of the Green/Duwamish River fishery is described in detail later in this chapter.

Impacts of Alternatives A-3/A-5 on Puget Sound. The following discussion evaluates the water quality impacts of Alternatives A-3/A-5 on the Puget Sound discharge area, and also on the sound as a whole. The two main phases of effluent dispersion are considered. The first phase is initial dilution of the effluent in the local vicinity (about 1 mile) of the diffuser. Initial dilution is controlled by design details of the diffuser, such as length, diameter, and number of ports (which has not yet been finally determined); and locational factors such as depth, density gradient in the water column, and the direction and velocity of wind-driven and tidal currents. The second phase is the dispersion of the initially diluted effluent into the circulating water masses of the sound, which is a function of net (long-term) current patterns in the sound as a whole.

Preliminary outfall designs specify discharge depths of 200 feet at both Alki Point (A-5) and Three Tree Point (A-3), with initial dilution ratios of at least 100:1; projected effluent qualities of Puget Sound and Green/Duwamish River discharges are shown in Table 6-1. In comparison, Metro's West Point outfall (about 120 MGD) discharges at a depth of 230 feet and achieves an initial dilution of about 100:1 (Schell, et al., 1977).

Initial Dilution. This discussion evaluates physical conditions at Alki Point and Three Tree Point for diluting the Renton effluent. Maximum dilution achievable within cost constraints is desirable to maintain a margin of safety for protecting beneficial uses.

Table 6-1. Estimated Influent and Effluent Concentrations from Proposed Treatment Plants in the Lake Washington/Green River Basins Study Area[a]

Parameter	Influent, mg/l[b]	Effluent from secondary treatment plant discharging to Puget Sound, mg/l[c]	Effluent from advanced secondary plant discharging to Duwamish, mg/l[d]	Effluent from advanced wastewater plant discharging to Duwamish, mg/l[e]
Total suspended solids	350.	30.	15.	5.
BOD_5	260.	30.	15.	5.
Grease	70.	10.	5.	1.
NH_3-N	16.	15.	1.	1.
NO_3-N	0.1	0.1	15.	1.
Total-P	10.	7.	7.	0.5
Lead	0.1	0.02	<0.02	<0.02
Zinc	1.0	0.07	0.07	0.04
Copper	0.2	0.04	0.04	0.02
Total chromium	0.2	0.02	0.02	0.01
Total coliform per 100 ml	500×10^5		1,500.	
Fecal coliform per 100 ml	40×10^5	1,500 (weekly ave.)	60.	
Chloroform[f]	5.	<0.1	<0.1	
Methylene chloride[f]	35.	30.	30.	
Pentachlorophenol[f]	13.	13.	13.	
Toluene[f]	20.	3.	3.	

[a] Developed from "Lake Washington/Green River Basins Wastewater Management Preliminary Plan," "Puget Sound Facilities Plan," and Renton treatment plant records.

[b] An assumed typical value for all proposed treatment plants. Actual concentrations may vary depending on tributary service areas and treatment plant combinations. Waste load projections for specific service areas and treatment plants were used for costing alternative schemes.

[c] Corresponds to the effluent from a Kenmore treatment plant and/or Renton treatment plant which discharges to Puget Sound. Satellite treatment plants will not produce effluent (i.e., land application systems).

[d] Corresponds to the effluent from a Renton treatment plant with nitrification.

[e] Corresponds to the effluent from a Renton treatment plant with P-removal, N-removal, GAC adsorption, and multimedia filtration.

[f] Results from one influent and one effluent sample at the Renton plant. Source: "Preliminary Toxicant Pretreatment Planning Study," Metro, January 1979.

SOURCE: Metro, pers. comm.

When treated sewage effluent is discharged from a submerged diffuser in seawater, the effluent immediately starts rising because the effluent is predominantly freshwater and therefore of lower density than the surrounding seawater. The effluent does not rise as a discrete mass. Surrounding seawater is entrained into the effluent plume as the plume rises. The higher the plume rises, the more dilute it becomes, and the more dense it becomes. Seawater loses about 1/100 of its density (expressed in sigma-t units) when mixed 100:1 with effluent.

Whether the plume rises to the water surface is determined by the presence of a density gradient in the water column. A density gradient is caused by heating of the surface layers by the sun, or by freshwater (from storm runoff) in the surface layers. If the density gradient is sufficiently strong, the effluent plume will cease rising and diffuse out in an underwater layer. If the density gradient is weak or nonexistent, the plume will rise to the surface before diffusing out laterally.

The higher the plume rises, the more dilute it becomes. Thus, for purposes of achieving maximum initial dilution and bacteria die-off, it is desirable for the plume to rise to the surface. However, to minimize human and shellfish contact with diluted effluent at the shoreline, it is desirable that the diluted effluent plume not rise to the surface.

For this EIS, historical depth vs. density data off Alki Point and Three Tree Point were obtained and analyzed to determine if one area was superior to the other in terms of having a stronger density stratification to suppress the rise of the effluent plume. If the effluent-seawater mixture at 200 feet is less dense than the surface density, the mixture (plume) should rise to the surface. Therefore, each set of depth vs. density data was analyzed by taking the measured sea water density at 200 feet, subtracting 1/100 of that density from the measured value (to simulate the mixing in of the effluent), and determining whether the resultant density (of the simulated "plume") would be able to rise to the surface.

The criterion for determining that the plume would not surface was the existence of measured densities in the overlying water column (between 0 and 200 feet) less than the calculated "plume" value. For example, if the measured density at 200 feet was 23.23 sigma-t units, the 100:1 effluent plume would have a density of 23.00 sigma-t units. If the surface density was between 23.00 and 23.23 sigma-t units, the effluent would surface. If the surface density was less than 23.00 sigma-t units the effluent plume would remain submerged.

The results of this stratification analysis by month are shown in Table 6-2. Density stratification sufficient to keep the plume from surfacing appears to be consistently more frequent at Three Tree Point than at Alki Point, on a month-by-month basis. The percentages given in Table 6-2 are relative estimates and may not accurately depict the actual incidence of effluent surfacing; effluent plume behavior is complex.

Initial dilution of 100:1 can probably be attained at either location, but incidences of the effluent plume rising to the surface are expected to be less at Three Tree Point. Metro has performed preliminary modeling of initial dilution of the effluent off Three Tree Point. The results indicate that an initial diltuon of 100:1 can be attained under the range of density gradient strength conditions found off Three Tree Point.

The work of Bendiner (1976) lends some uncertainty to the prediction that stratification will prevent surfacing of the effluent. He found that relatively high concentrations of West Point effluent (up to 270:1 dilution) reached the shoreline when summer stratification existed over the diffuser. He theorized that the submerged effluent plume may be able to "work around the edges" of the density gradient where, as the density gradient meets the bottom near shore, a turbulent bottom boundary layer forms and stratification breaks down locally. During winter, effluent contact with the shoreline was not found.

Effluent Dispersion. Once the effluent plume has undergone initial dilution, its subsequent dispersion is determined by tidal current patterns and wind-driven currents if the plume surfaces. NOAA tidal current charts (Figures 6-4 and 6-5) show that, in general, tidal current velocities are stronger and more predictable near Alki Point than near Three Tree Point. Thus for purposes of more rapidly dispersing the effluent plume, the Alki Point area appears superior to the Three Tree Point area.

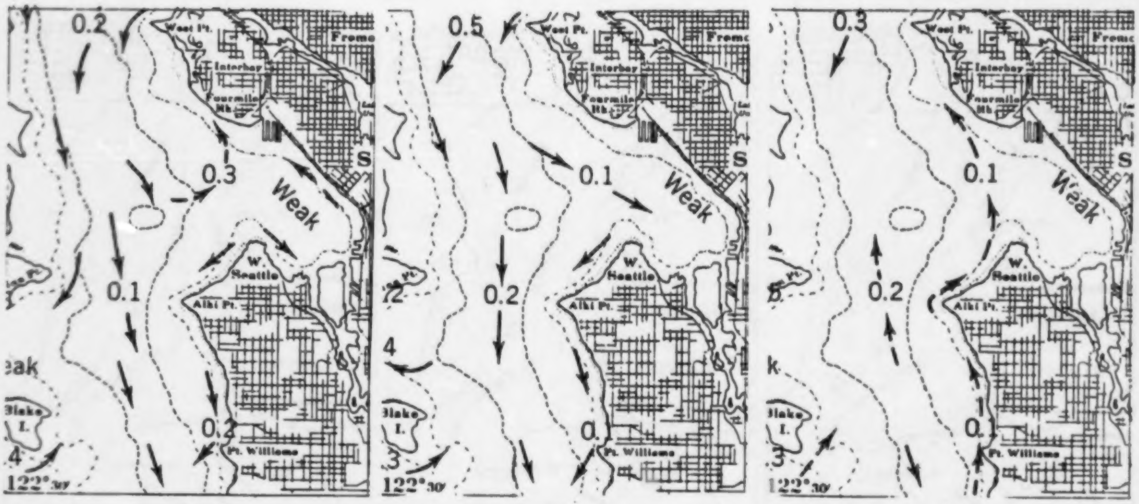
Although Figures 6-4 and 6-5 give a general indication of current speed, they do not indicate the detailed current directions at the alternative discharge locations. Studies of local tidal current speed and direction at both locations have been done on the University of Washington Puget Sound hydraulic model and on location.

Figure 6-6 shows current directions at the alternative discharge locations as determined by the University of Washington Puget Sound model. At Seahurst Park, no appreciable current is seen at lower low water. A shoreward eddy develops at higher high water and a seaward eddy develops

Table 6-2. Vertical Density Differences (200 feet vs. surface) at Three Tree Point and Alki Point

	Three Tree Point		Alki Point	
	Number of Observations	Percent of Time Weakly Stratified	Number of Observations	Percent of Time Weakly Stratified
January	6	50	12	67
February	8	25	13	31
March	11	10	13	62
April	11	0	13	38
May	12	0	13	8
June	10	0	9	11
July	9	0	10	0
August	6	17	6	17
September	7	14	5	40
October	9	44	9	78
November	9	56	11	82
December	15	60	11	82

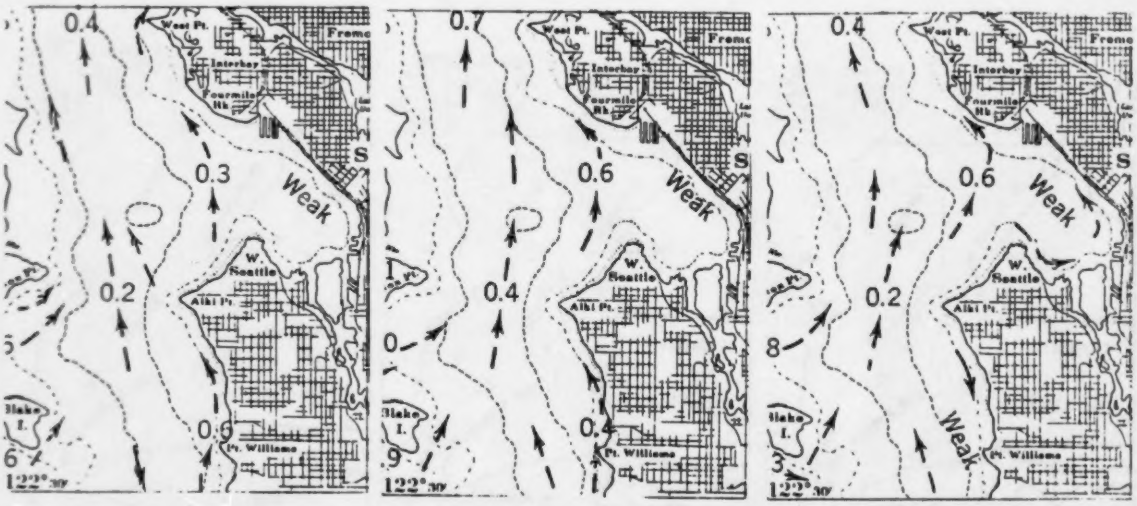
Note: The criterion for "weakly stratified" was a vertical difference in sigma-t equal to or less than 1/100 of the sigma-t at 200 feet. This approximates conditions such that the effluent plume would surface. (Raw data supplied by E. Collias, Northwest Consultant Oceanographics, Inc.)



2 hrs. before maximum flood

Maximum flood

2 hrs. after maximum flood



2 hrs. before maximum ebb

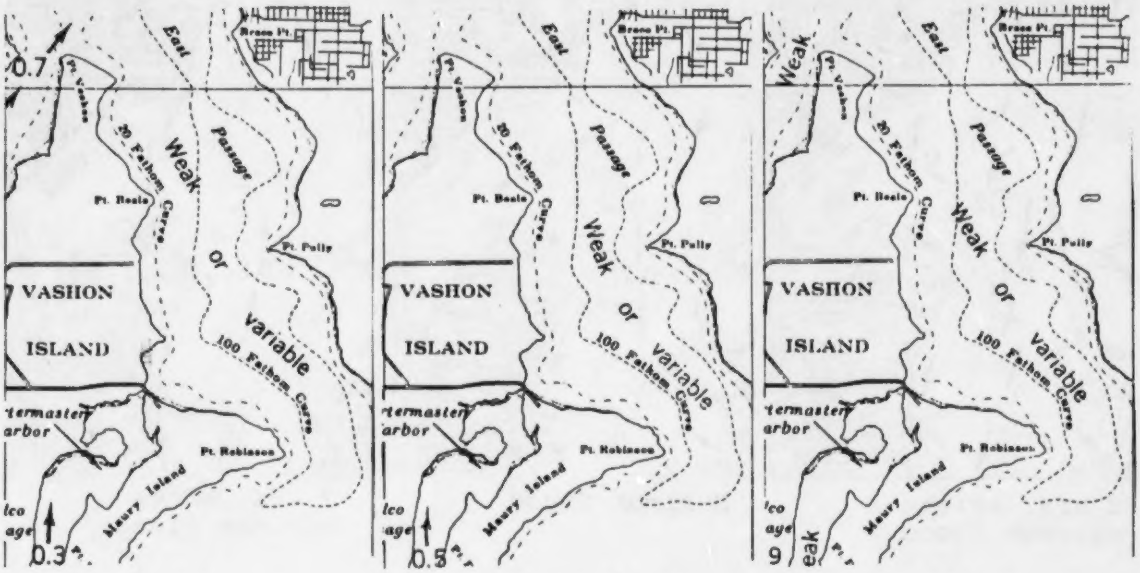
Maximum ebb

2 hrs. after maximum ebb

Figure 6-4. Tidal Current Direction and Typical Velocities Near Alki Point.

Note: Maximum flood and ebb are relative to Admiralty Inlet.

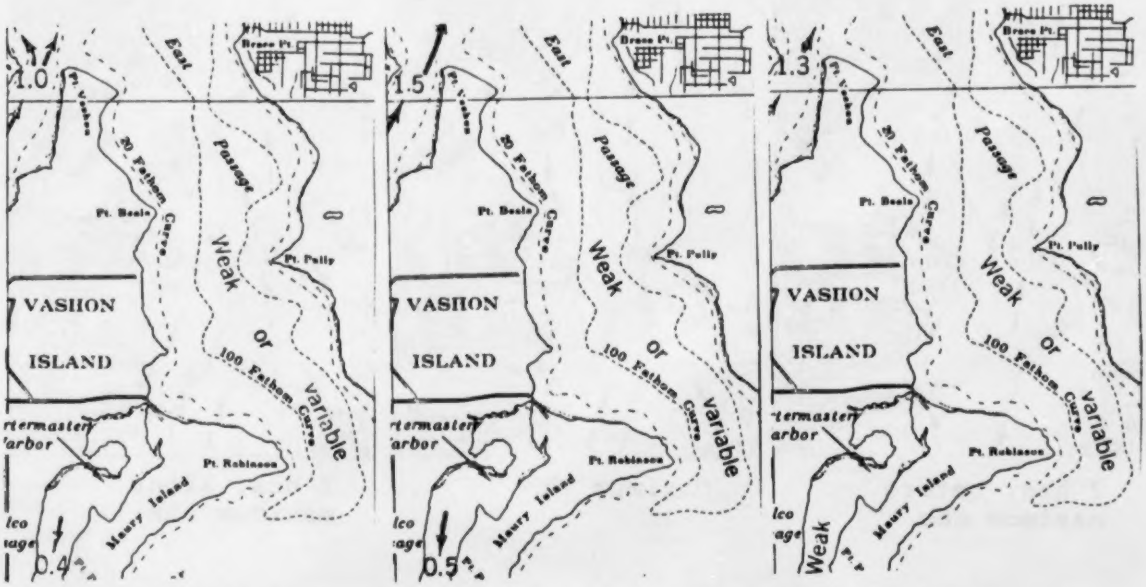
SOURCE: NOAA, 1973a.



2 hrs. before maximum flood

Maximum flood

2 hrs. after maximum flood



2 hrs. before maximum ebb

Maximum ebb

2 hrs. after maximum ebb

Figure 6-5. Tidal Current Direction and Typical Velocities Near Three Tree Point (Point Pulley).

NOTE: Maximum flood and ebb are relative to the Tacoma Narrows.

SOURCE: NOAA, 1973b.

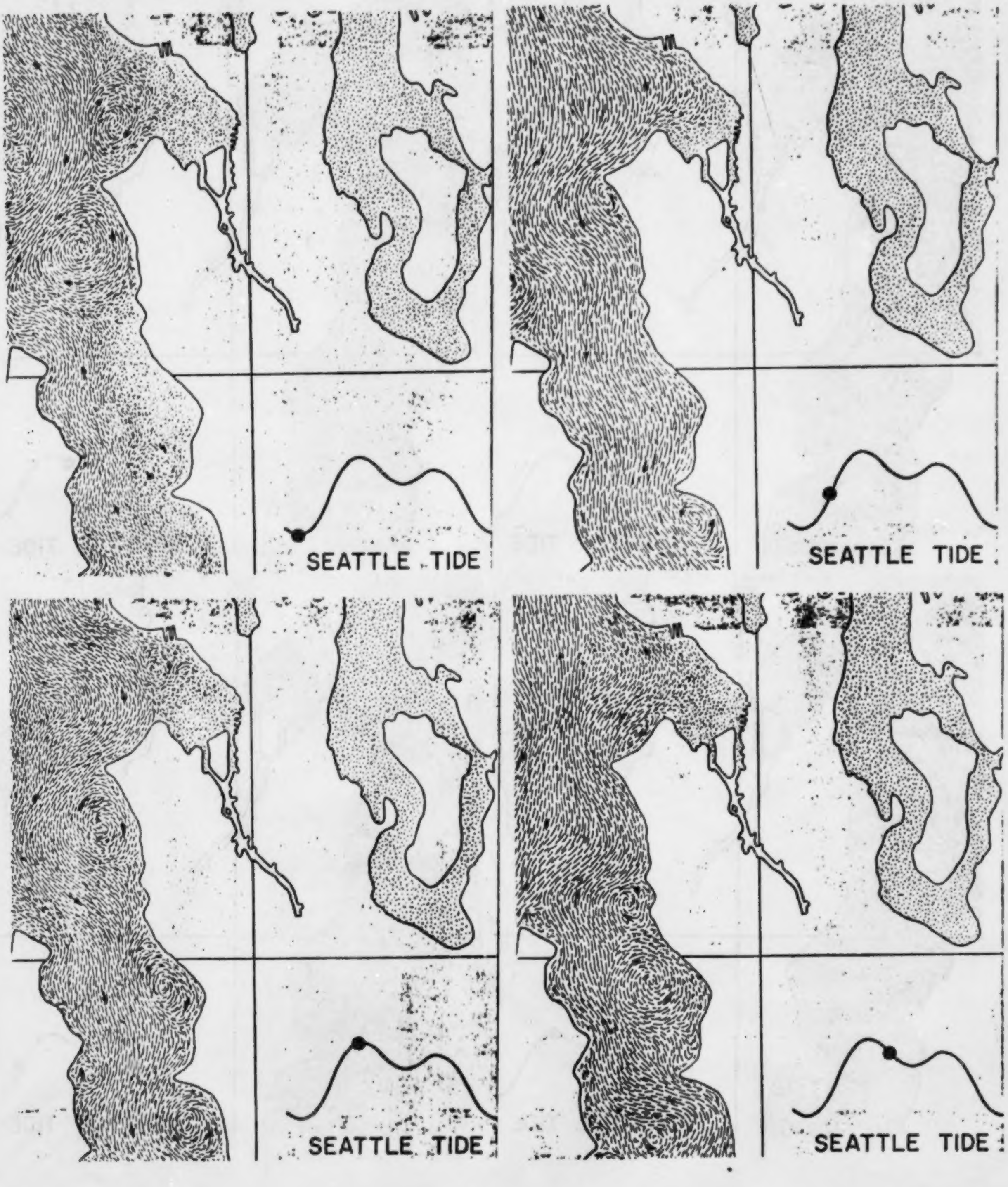


Figure 6-6. Surface Current Directions in Central Puget Sound as Determined by University of Washington Puget Sound Model (pg. 1 of 2).

SOURCE: McGary and Lincoln, 1977.

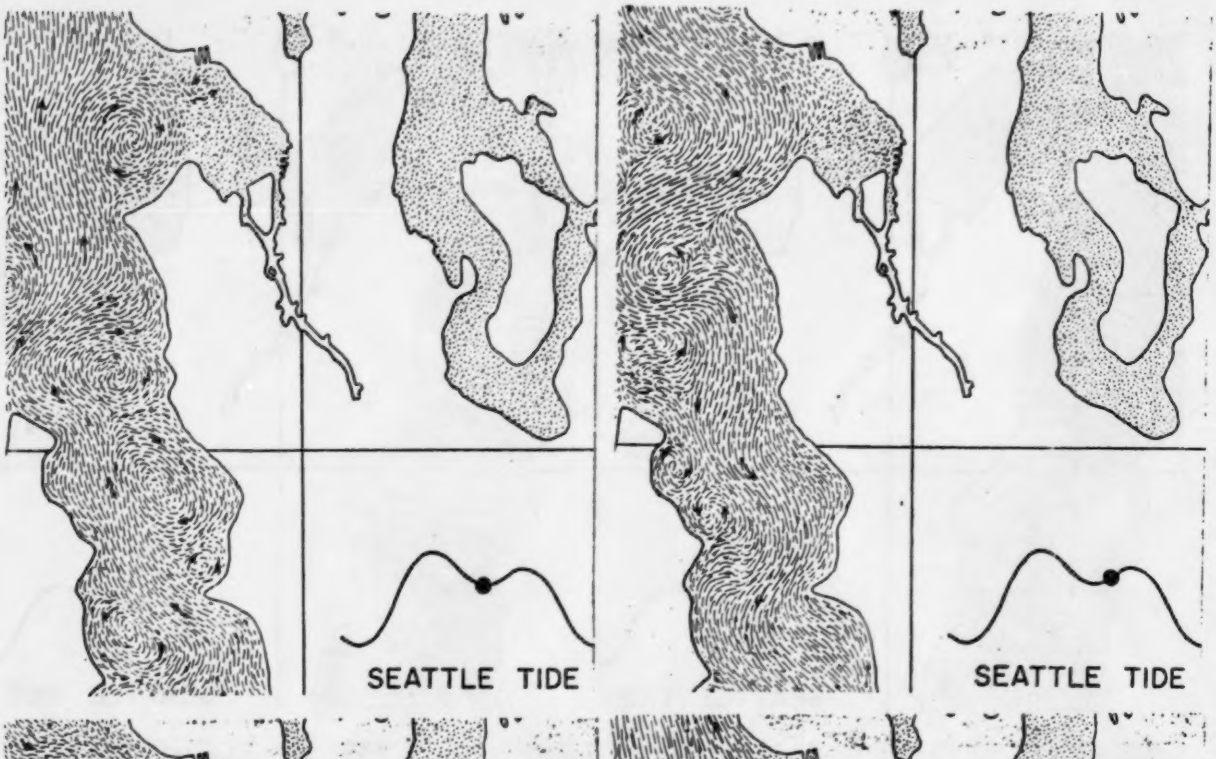


Figure 6-6 (pg. 2 of 2).

between higher high and higher low water. Flows parallel to the shore are present during the maximum flood and ebb. At Alki Point, shoreward eddies develop at lower low water, during maximum flood tide and during both ebb tides.

On-location current speed and direction studies were conducted off Alki Point in 1933 and at Alki, Seahurst Park (Salmon Creek) and Three Tree Point in 1957 (Brown and Caldwell, 1958). At Alki Point, the data showed onshore eddies on both sides of the point at certain times of the tidal cycle (Figures 6-7 and 6-8). At Seahurst Park, shoreward currents formed during falling tidal stage (Figure 6-9). Onshore current velocities averaged 13 feet per minute (0.15 mph) at the surface and 10 feet per minute (0.11 mph) at depths of 100-200 feet. At Three Tree Point, onshore current eddies were found during ebb and flood tides at higher tidal ranges (Figure 6-10). During lower tidal ranges, current conditions were erratic (Brown and Caldwell, 1958). Shoreward travel times west of Three Tree Point were found to vary from about 2 hours from 1,000 feet offshore to over 4 hours from 2,000 feet offshore (travel speed about 0.10 mph).

A special study of effluent plume behavior at the alternative discharge locations on the University of Washington Puget Sound model was conducted as part of the facilities planning/EIS process. The model can provide relative comparisons of effluent plume behavior at different outfall locations. However, the model has several dissimilarities to actual water behavior in Puget Sound that should be kept in mind when interpreting results:

- The model underestimates dispersion (i.e., is more "syrupy" than actual Puget Sound waters).
- Water behavior near the shoreline is not predicted well.
- Effluent in the model is discharged through a single point rather than a multipost diffuser.

Following are the general qualitative conclusions of the modeling study:

- Effluent plume "pooling" in the vicinity of the discharge occurs to a greater degree, and under a wider range of conditions, at Seahurst Park than at Alki Point.
- Dispersal of the diluted effluent plume in the main body of central Puget Sound occurs more slowly off the Seahurst-Three Tree Point area than off the Alki Point area.

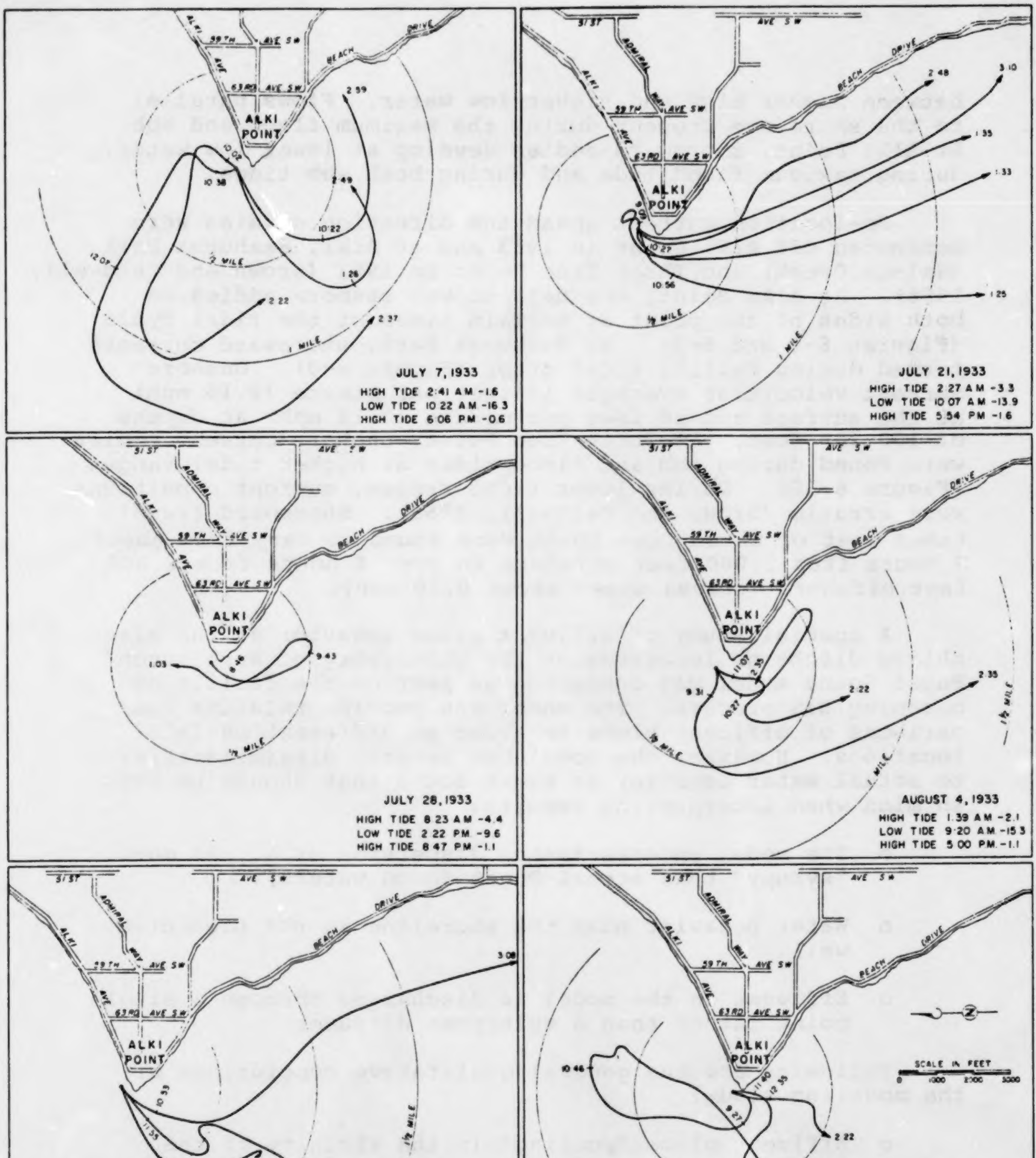


Figure 6-7. Surface Current Studies off Alki Point.

SOURCE: Brown and Caldwell, 1958.

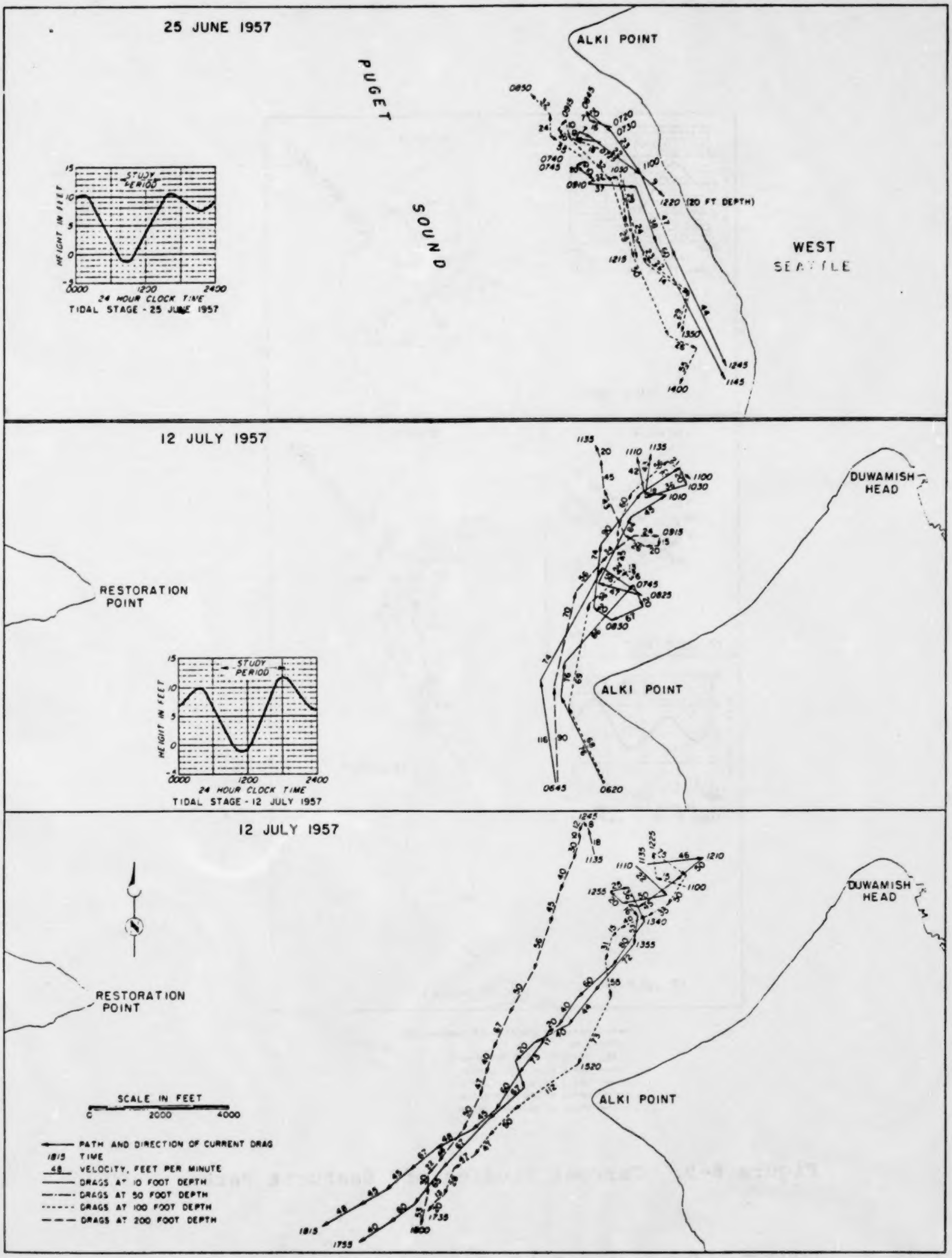


Figure 6-8. Current Studies off Alki Point.

SOURCE: Brown and Caldwell, 1958.

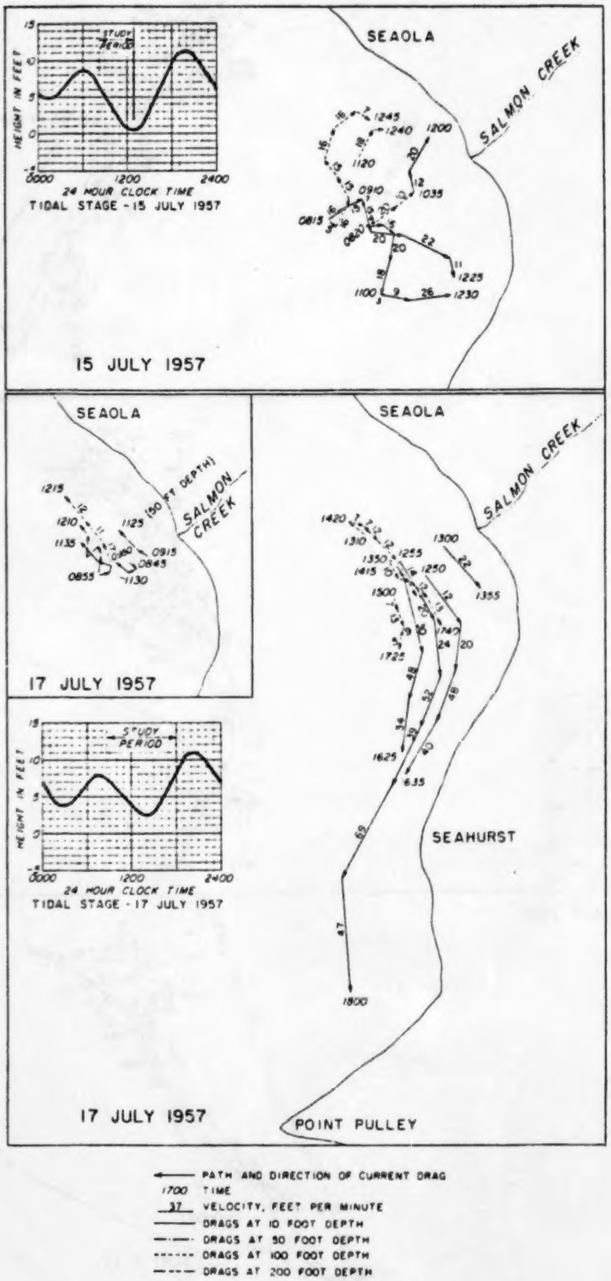


Figure 6-9. Current Studies off Seahurst Park.

SOURCE: Brown and Caldwell, 1958.

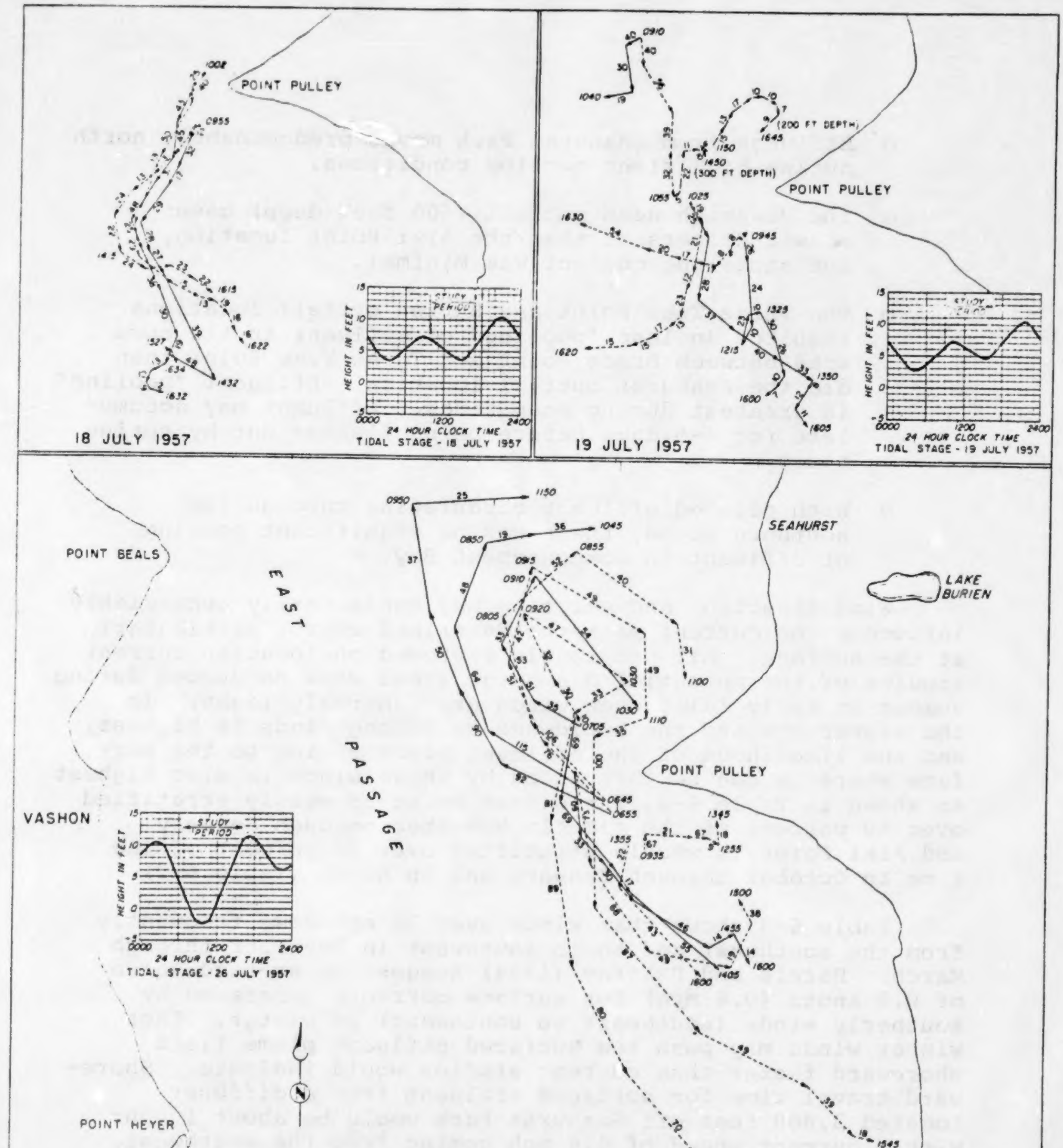


Figure 6-10. Current Studies off Three Tree Point (Point Pulley).
SOURCE: Brown and Caldwell, 1958.

- Effluent from Seahurst Park moves predominantly north during high river outflow conditions.
- The Duwamish Head outfall (600 feet deep) gave slower dispersion than the Alki Point location, but shoreline contact was minimal.
- The Three Tree Point and Burien outfall locations resulted in less "pooling" of effluent in the cove area between Brace Point and Three Tree Point than did the Seahurst outfall location. Effluent "pooling" is greatest during neap tides. Effluent may accumulate for 4-5 days before being flushed out by spring tides.
- With diluted effluent circulating through the southern sound, there was no significant pooling of effluent in Commencement Bay.

Wind direction and velocity may occasionally appreciably influence the current patterns described above, particularly at the surface. All previously reviewed on-location current studies of the potential discharge areas were conducted during summer or early fall, when winds are generally light. In the winter months, the incidence of strong winds is highest, and the likelihood of the effluent plume rising to the surface where it can be influenced by those winds is also highest. As shown in Table 6-2, Three Tree Point is weakly stratified over 50 percent of the time in November through January, and Alki Point is weakly stratified over 50 percent of the time in October through January and in March (Table 6-2).

Table 6-3 shows that winds over 10 mph come frequently from the southwest and south-southwest in December through March. Harris and Rattray (1954) suggest an average value of 0.5 knots (0.6 mph) for surface currents generated by southerly winds (southeast to southwest) in winter. Thus winter winds may push the surfaced effluent plume field shoreward faster than current studies would indicate. Shoreward travel time for surfaced effluent from a diffuser located 3,000 feet off Seahurst Park would be about 1 hour with a current speed of 0.6 mph coming from the southwest. Shoreward travel time from a diffuser northwest of Alki Point would be about 7 hours. This shoreward travel would occur after initial dilution of 100:1 from the diffuser was achieved.

Cumulative Impacts of Alternatives A-3/A-5. This analysis considers the cumulative effects of the Renton discharge at the recommended location (Seahurst Park) and other municipal and industrial discharges to the southern portion of Puget Sound. Because of net circulation patterns

Table 6-3. Predominate Directions of Winds Greater than 10 MPH at Sea Tac Airport

Month	Predominate Wind Directions (percent frequency of observation)	
January	SSW(21)	SW(17)
February	SW(12)	SSW(11)
March	SW(20)	SSW(13)
April	SW(22)	NE(10)
May	SW(15)	NE(10)
June	SW(20)	NE(8)
July	NE(10)	N(10)
August	SW(14)	N(7)
September	N(11)	NNE(11)
October	NNE(11)	SW(10)
November	S(9)	SSW(8)
December	SSW(13)	S(12)

SOURCE: Harris and Rattray, 1954.

in Puget Sound, diluted effluent discharged at the Seahurst Park-Three Tree Point area would be drawn south and around Vashon Island in a clockwise direction. Some diluted effluent would probably pass through the Tacoma Narrows and have some residence time in south Puget Sound. The diluted effluent would then be drawn up Colvas Passage and be carried north toward the open ocean. Perhaps 20-25 percent of the diluted effluent would be recycled south again and around Vashon Island (Metro, pers. comm.).

The net movement of water volume per unit time in the counterclockwise direction around Vashon Island is not well known and probably varies considerably with tidal prism and season. For discharge planning purposes, Metro is using a figure of 1,500:1 final dilution of the effluent as it passes around Vashon Island, including 99 MGD Renton effluent, 200 MGD effluent from other south sound discharges, and 25 percent recycle around Vashon Island.

To compare the pollutant loading of the Renton plant to other discharges into southern Puget Sound, NPDES permit data were compiled for all municipal discharges and the major industrial discharges south of Alki Point. (NPDES permits are issued to all point-source dischargers by the Washington Department of Ecology. The NPDES permits specify maximum allowable pollutant loadings.)

Table 6-4 summarizes the biochemical oxygen demand (BOD) loading data. Based on present NPDES limits for south sound discharges and year 2000 Renton projections, the Renton plant at 72 MGD would contribute 15 percent of the total point source BOD loading to the south sound; the Renton plant at 99 MGD would contribute 19 percent of the total point source load. If the planned 1982 reduction in Olympia's BOD loading is considered, these figures become 25 percent and 31 percent, respectively. This analysis considers only point source pollutant loads; if nonpoint source (rivers and urban runoff) were also considered, the Renton plant contribution for total BOD loadings would be less.

BOD is used here as an index of overall pollutant loading. While there are many shortfalls of this approach, since oxygen depletion is not the water quality effect of greatest concern in Puget Sound, it appears to be the best way to compare cumulative loadings based on available data. (Cumulative heavy metals loadings to Puget Sound are discussed later in this chapter, and shown in Table 6-6.)

There is virtually no scientific information on the present cumulative chemical or biological effects of all discharges to the south sound, mainly because data do not

Table 6-4. Pollutant Loading Summary of Renton Alternatives and NPDES Data for Puget Sound Discharges from Alki Point South

	Flow (MGD)	Monthly Average BOD (lbs/day)
Year 2000 Renton Alternatives		
Renton - 72 MGD[1]	72	19,500
Renton - 99 MGD[2]	99	27,000
Other STPs, Present NPDES Limits	156	99,616 (44,766 after Olympia goes on secondary treatment, December 1982)
Industrial Discharges, NPDES Limits	85.5	14,429
Fish Hatcheries	39.4	- (6,206 lbs/day suspended solids)

[1] Capacity provided under final plan recommended program.

[2] Capacity provided under Alternatives A-3/A-5.

SOURCE: DOE NPDES file data.

exist that could document subtle long-term basinwide changes. The pollution problems that have been reported in localized aras of the south sound appear to be related mainly to discharge and leaching of industrial wastes (e.g., Commencement Bay), not treated municipal wastewater.

Turbidity. Suspended organic solids are the main component of turbidity in treated sewage effluent. Turbidity can potentially affect light penetration, algal production, and aesthetic values in receiving waters. Suspended organic solids also can be a source of organic enrichment and toxic substances.

Discharge to Puget Sound may cause measurable local turbidity changes. Turbidity is the most detectable water quality parameter of the West Point discharge (Environmental Quality Analysts, 1974). The wastewater field and its associated turbidity are present at subsurface depths ranging from 20-50 meters. The turbidity is not associated with any known adverse impacts.

Because of a higher level of treatment, the turbidity effects of a Renton plant discharge to Puget Sound would probably be considerably less than at West Point. The West Point plant discharges primary effluent with a suspended solids concentration of about 75 mg/l, occasionally exceeding 120 mg/l in summer. A Renton outfall would discharge secondary effluent with a suspended solids concentration of about 30 mg/l. There are no apparent advantages or disadvantages associated with any of the alternative Puget Sound discharge locations with respect to turbidity

Un-ionized Ammonia. Ammonia is a characteristic product of treated sewage formed by the decomposition of nitrogenous organic compounds. The un-ionized form of ammonia, NH_3, is of concern for its potential toxicity to aquatic life. Un-ionized ammonia is toxic (LC50) to salmonid fishes at concentrations of about 0.2-0.7 mg/l (Willingham, et al., 1979). The 96-hour LC50 for coho salmon in Renton effluent is 0.45 mg/l NH_3-N (Buckley, 1978).

The State of Washington has not set numerical receiving water standards for ammonia. The EPA (1976) criterion for un-ionized ammonia is 0.02 mg/l for fresh water. Little information exists on ammonia toxicity under marine and estuarine conditions, and EPA has not established a criterion for these conditions.

Under Alternatives A-3/A-5, the Renton discharge to Puget Sound would not have denitrification in the process train, and concentrations of total ammonia nitrogen in the effluent would be about 15 mg/l. Un-ionized ammonia is usually only a small portion of total ammonia. Un-ionized ammonia is the form of ammonia toxic to aquatic life. Because no ammonia toxicity problems have been found with the West Point discharge, no problems are expected to develop for the Renton plant; rapid initial dilution would probably prevent ammonia toxicity.

Dissolved Oxygen. Based on data from the West Point plant, dissolved oxygen (DO) problems are not foreseen with the preferred program. A local DO sag of about 0.5 mg/l has been found in the West Point plume (EPA, 1977a). The West Point discharge is primary effluent, with a biochemical oxygen demand (BOD) of about 100 mg/l, and flows were about 120 MGD when the DO sag was observed. In contrast, the Renton discharge would be secondary effluent, with a BOD of about 30 mg/l and flows would be about 100 MGD in the year 2000. Thus, very little, if any, DO sag should be noticeable with a Puget Sound discharge of Renton effluent.

Nutrients. Nutrients in sewage effluent are of concern because they can stimulate algal growth to levels that are visually offensive, or that cause DO sags through algal respiration or death. Algal growth in Puget Sound is usually limited by light, rather than nutrients, so nutrients are not of great concern for their biostimulatory potential. Nutrients typically of concern in sewage effluent are phosphorus (as orthophosphate) and nitrogen (as ammonia, NH_3; nitrite, NO_2; or nitrate NO_3). There are no numerical state or federal standards for phosphorus or nitrogen with regard to algal growth stimulation because levels which would cause adverse effects vary greatly among water bodies.

Discharge of effluent to Puget Sound would result in local increases in ammonia, nitrate, and phosphate. Increases in ammonia are detectable within a radius of about 1 mile of the West Point outfall (Collias and Lincoln, 1977). Nutrient concentrations discharged from a Renton plant with secondary treatment discharging to Puget Sound would be somewhat less than those from West Point due to the higher degree of treatment involved.

Chlorine Toxicity. Chlorine could be one of the greater toxicity components of a future Renton discharge into Puget Sound, as indicated by bioassay tests of the West Point effluent (Stober, et al., 1977) and of the Renton effluent (Buckley and Matsuda, 1973). The Renton effluent was found toxic to coho salmon (96-hour LC50) at a chlorine residual concentration of 0.20 mg/l (Buckley and Matsuda, 1973).

Under Alternatives A-3/A-5, the Renton discharge will probably have a chlorine residual concentration of about 0.01 mg/l (Metro, pers. comm.). This would meet the EPA (1976) criterion of 0.002 mg/l following 100:1 dilution. Dechlorination could be added if necessary (Metro, pers. comm.).

Bacteria. Violations of coliform standards at east Puget Sound beaches have not been attributed to existing treated sewage discharges. Urban runoff is probably a main cause. There appear to be no direct advantages at any alternative Puget Sound discharge site with respect to maintaining coliform standards. After 100:1 dilution, fecal coliform bacteria levels in the effluent would be reduced from 1,500/100 ml to 15/100 ml at a maximum. Levels would actually be considerably lower due to die-off of the bacteria when the effluent contacts seawater. The shellfish standard at the beaches is 14/100 ml. Although the actual fitness of shellfish for human consumption should not be affected, the possibility exists that DSHS could decertify subtidal geoduck beds near the outfall from potential commercial harvest, as a safety factor for public health.

One benefit associated with the Alki Point alternative is that combined sewer overflows (CSOs) to the Duwamish estuary could be intercepted and routed to a discharge point offshore. The water quality benefits may be marginal. CSOs occur during or shortly after winter storms, when river flow is high, and CSO effluent is probably rapidly diluted and carried into Puget Sound with the high flows.

Heavy Metals. Heavy metals are of concern for their acute toxicity to aquatic life, and also for their tendency to accumulate over time in the flesh of organisms and in sediments. In one sense, the environment has no assimilative capacity for heavy metals, since they accumulate in the environment and they do not detoxify or break down.

Table 6-5 shows the effect that a Renton discharge to Puget Sound would have on background heavy metals concentrations after initial dilution (100:1) and dilution after one tidal cycle (500:1). These dilution values are approximations for the West Point discharge from Schell, et al. (1977). Table 6-5 also shows numerical EPA (1976) receiving water criteria. It is evident from Table 6-5 that the Renton discharge would increase heavy metals concentrations in Puget Sound by a small amount.

Table 6-5. Effect of Renton Effluent on Heavy Metals Concentrations in ug/l, in Puget Sound

	Background Concentration[1]	Renton Effluent (Jan 1978-Sep 1979)[2]		Receiving Water Concentration		EPA Criterion[3]
		Average	Range	After Initial Dilution (100:1)	After 1 Tidal Cycle (500:1)	
Cadmium	0.36	<4	< 4	< 0.40	< 0.37	5.0
Chromium	-	20	10-30	-	-	18 (h exavalent)
Copper	0.57	30	20-60	0.86	0.63	40
Lead	3.68	< 20	< 20	3.84	3.71	-
Mercury	-	1.4	0.3-2.8	-	-	0.025
Nickel	1.33	30	10-40	1.61	1.39	7.1
Zinc	2.3	40	30-60	2.67	2.38	58

[1] SOURCE: Huntamer, 1976 in Schell, et al., 1977.

[2] SOURCE: Metro, 1979d.

[3] SOURCE: Federal Register, November 28, 1980. Values are 24-hour averages.

Table 6-6 compares projected copper, lead, and zinc loading to Puget Sound from the Renton discharge to other sources of these metals. The Renton contribution would again be relatively small. Loadings for other metals are not available.

Although a Renton discharge to Puget Sound would contribute some heavy metals, no direct adverse effects are expected in light of the great dilution that would occur in Puget Sound and the relatively small portion of the total metals load that the Renton discharge would contribute. In general, heavy metals in wastewater effluent tend to adhere to fine particulate matter which coagulates and settles when discharged into sea water. Settling of fine particulate matter generally occurs in areas of relatively low slope and slow tidal current velocity. Settling of particulate matter will probably occur within the immediate vicinity of the discharge.

Some particulates may also be transported to areas farther away from the immediate discharge vicinity that are "depositional", i.e., areas of slow current velocity where fine sediments tend to settle. Depositional areas in estuaries are generally evidenced by a high percentage of fine sediments that have a high water content (i.e., "fluffy"). Figure 6-11 shows bottom sediment types in the proposed discharge areas. The "mud" area along the central axis of the sound would be a depositional environment for heavy metals. Because the preliminary outfall length is about 3,000 feet, effluent would not be discharged directly over the depositional muds, but some metals from Renton effluent would eventually be transported to this area.

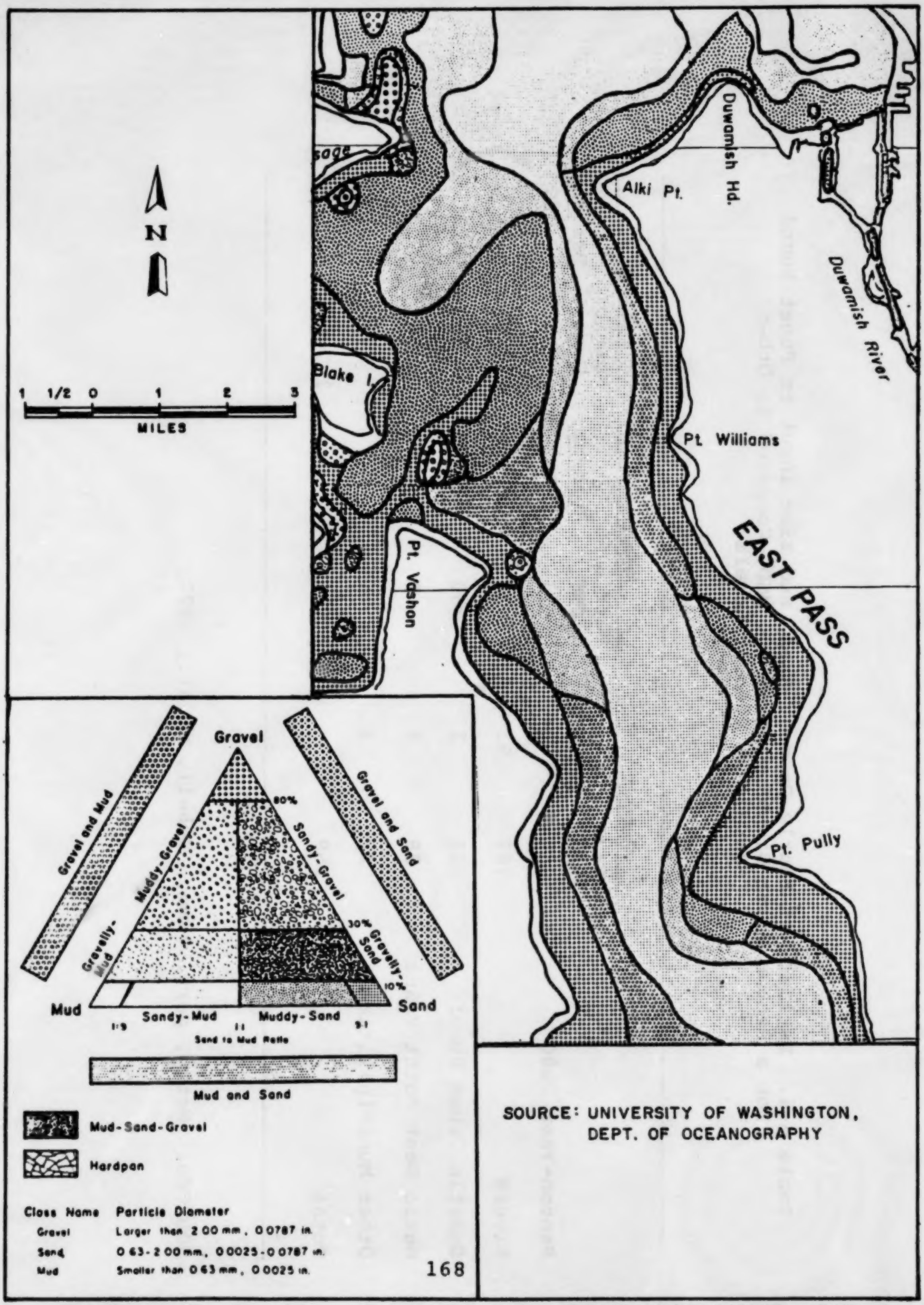
Toxic Organic Substances. The potential effect of toxic substances in Renton effluent on Puget Sound water quality is unknown. There is little existing information on either toxic organic substances in Puget Sound or the effects of chlorination of Metro discharges on the formation of toxic organic compounds.

In 1979, organic compounds were sampled in Hylebos Waterway near Tacoma (Riley, et al., 1980). Six chlorinated compounds and five aromatic compounds identified were on EPA's list of priority pollutants. In the same study sampling in Elliott Bay revealed relatively small or undetectable amounts of saturate and aromatic hydrocarbons, and there was no attempt to identify them. It appears that these problems are related mainly to industrial waste discharges and not to discharge of treated municipal wastewater. Metro is presently starting a 3-year toxicant study which will study toxicant sources, treatment processes, and fates in the environment.

Table 6-6. Estimate of Yearly Copper, Lead, and Zinc Input to Puget Sound for a Renton Plant Discharging at 100 MGD, Compared to Other Sources at Present Levels

	Copper		Lead		Zinc	
	Metric Tons	Percent	Metric Tons	Percent	Metric Tons	Percent
Renton-Year 2000	6	1	3	0.1	10	0.6
Rivers	787	92	2,032	84	1,624	92
Seattle Urban Runoff	15	2	350	15	50	3
Metro West Point Plant	29	3	9	0.4	56	3
Other Municipalities	22	3	16	0.7	26	1
Total	859		2,410		1,766	

SOURCES: Metro, pers. comm.; Schell, et al., 1977.



SOURCE: UNIVERSITY OF WASHINGTON,
DEPT. OF OCEANOGRAPHY

FIGURE 6-11. SURFACE SEDIMENTS OF PUGET SOUND IN VICINITY OF ALTERNATIVE DISCHARGE AREAS

Impacts of Alternatives A-3/A-5 on Green/Duwamish River. Alternatives A-3/A-5 will remove the Renton effluent from the Green/Duwamish River. Although the intended effect is to improve water quality in the river, the hydrologic and water quality effects of effluent removal, especially in relation to other proposed actions in the river, warrant examination. These topics are analyzed below.

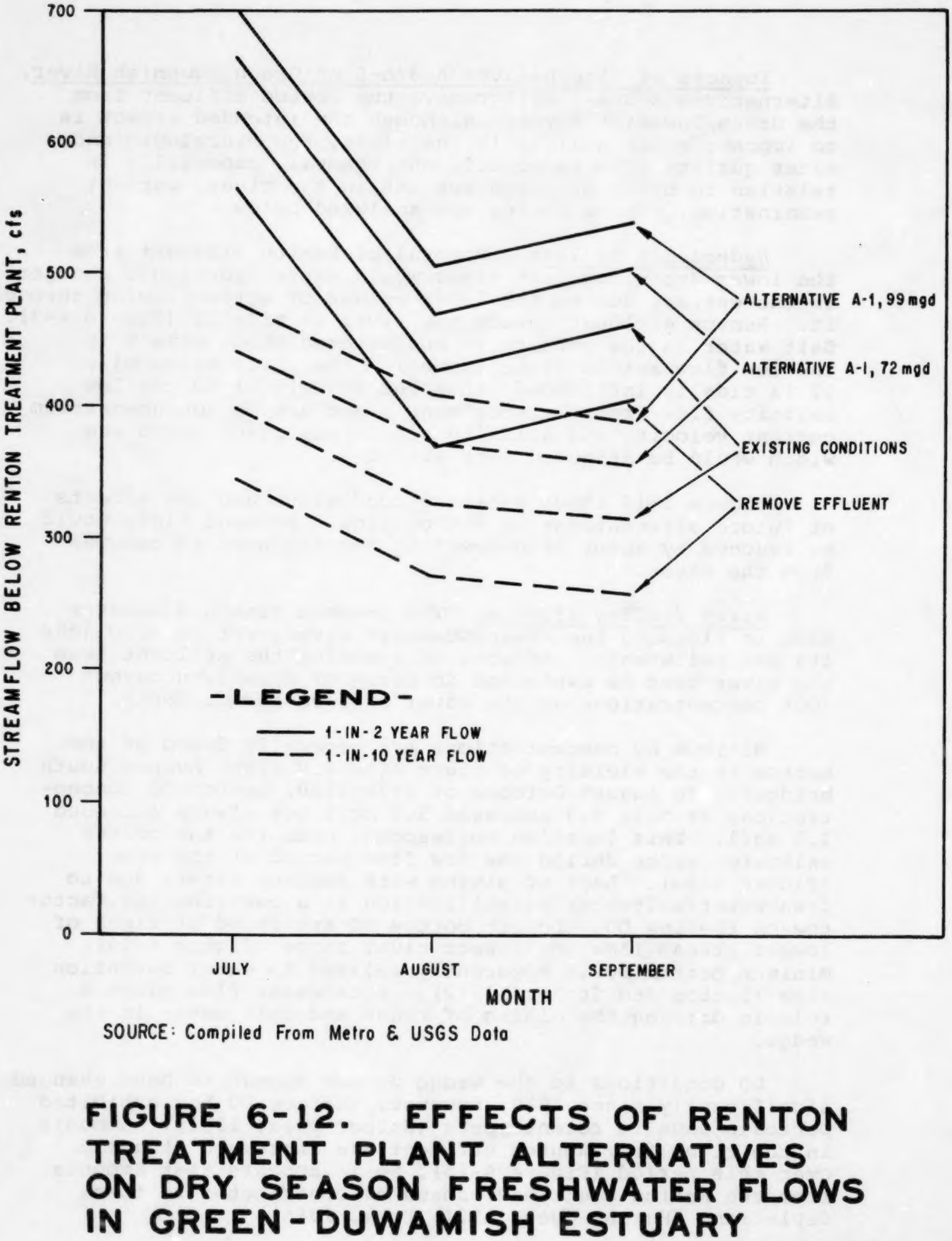
Hydrologic Effects. Removal of Renton effluent from the lower Green/Duwamish River would cause hydrologic changes in the estuary due to the lower volume of water flowing through it. Renton effluent enters the river at mile 12 (Figure 6-3). Salt water in the estuary is encountered about mile 8 in the low flow season (late summer). The river below mile 12 is tidally influenced; thus the effects of 50 cfs low salinity flow from the treatment plant are on net downstream current velocity and salinity repulsion; river depth and width would be affected very little.

Figure 6-12 shows existing conditions and the effects of future alternatives on net outflow. Present flows would be reduced by about 18 percent if the effluent is removed from the river.

Water Quality Effects. The present Renton discharge aids in flushing the Green/Duwamish River, yet it also adds its own pollutants. Effects of removing the effluent from the river must be explained in terms of dissolved oxygen (DO) concentrations at the water surface and at depth.

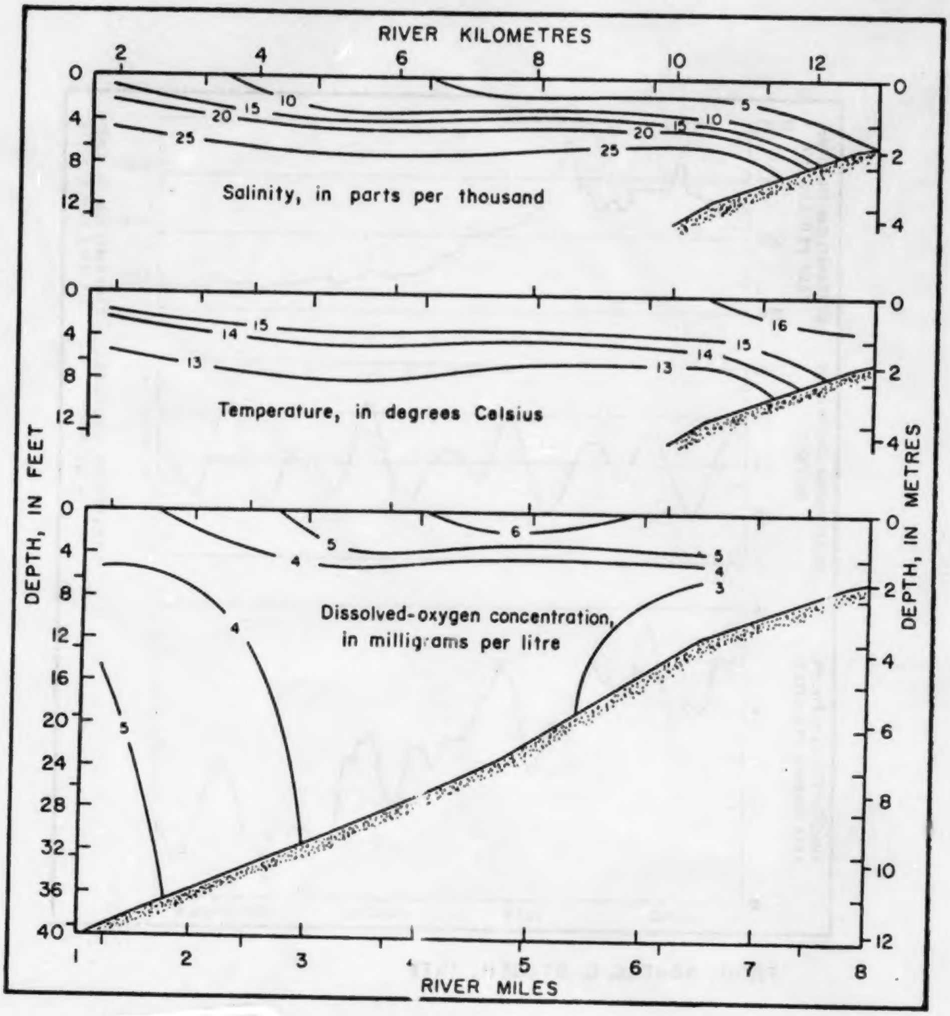
Minimum DO concentrations are generally found at the bottom in the vicinity of river mile 4.8 (16th Avenue South bridge). In August-October of 1976-1980, bottom DO concentrations at mile 4.8 averaged 5.3 mg/l but always exceeded 3.5 mg/l. This location corresponds with the toe of the saltwater wedge during the low flow period of the year (Figure 6-13). Lack of mixing with surface waters due to freshwater/saltwater stratification is a contributing factor toward the low DO. Lowest bottom DO are found at times of lowest stream flow and lowest tidal range (Figure 6-14). Minimum bottom DO is apparently related to water retention time (Santos and Stoner, 1972). Freshwater flow plays a role in driving the mixing of fresh and salt water in the wedge.

DO conditions in the wedge do not appear to have changed significantly since 1970; however, surface DO has exhibited periodic sags in recent years (Harper-Owes, 1981). Ammonia in the river from Renton effluent has increased steadily over this period (Figure 6-15), so it appears that ammonia from the Renton plant has caused or contributed to these depletions (Harper-Owes, 1981; Yake, 1980).



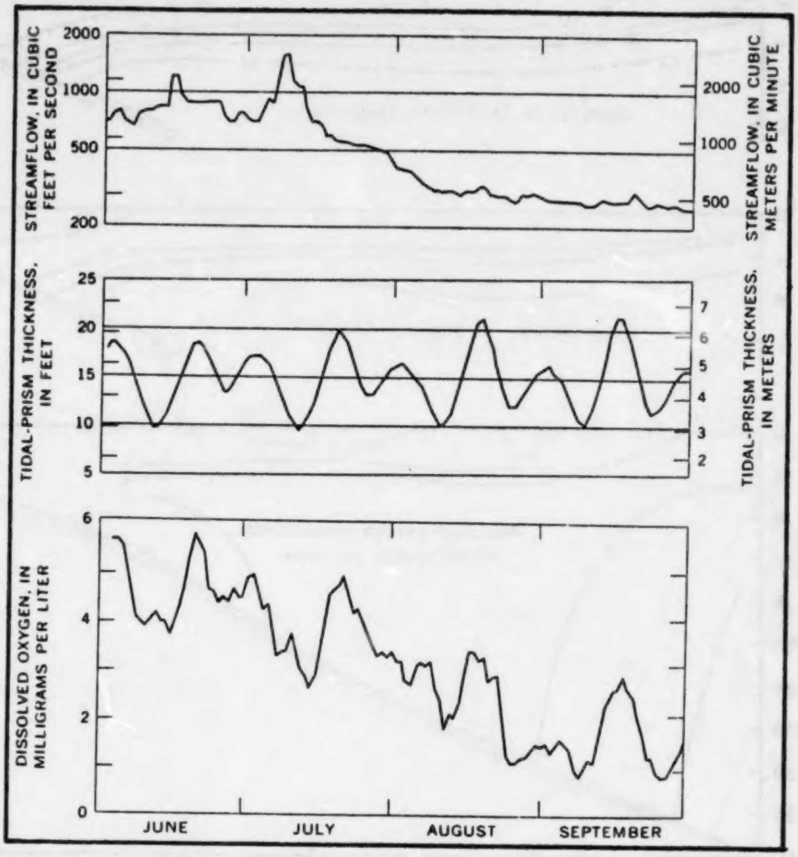
SOURCE: Compiled From Metro & USGS Data

FIGURE 6-12. EFFECTS OF RENTON TREATMENT PLANT ALTERNATIVES ON DRY SEASON FRESHWATER FLOWS IN GREEN-DUWAMISH ESTUARY



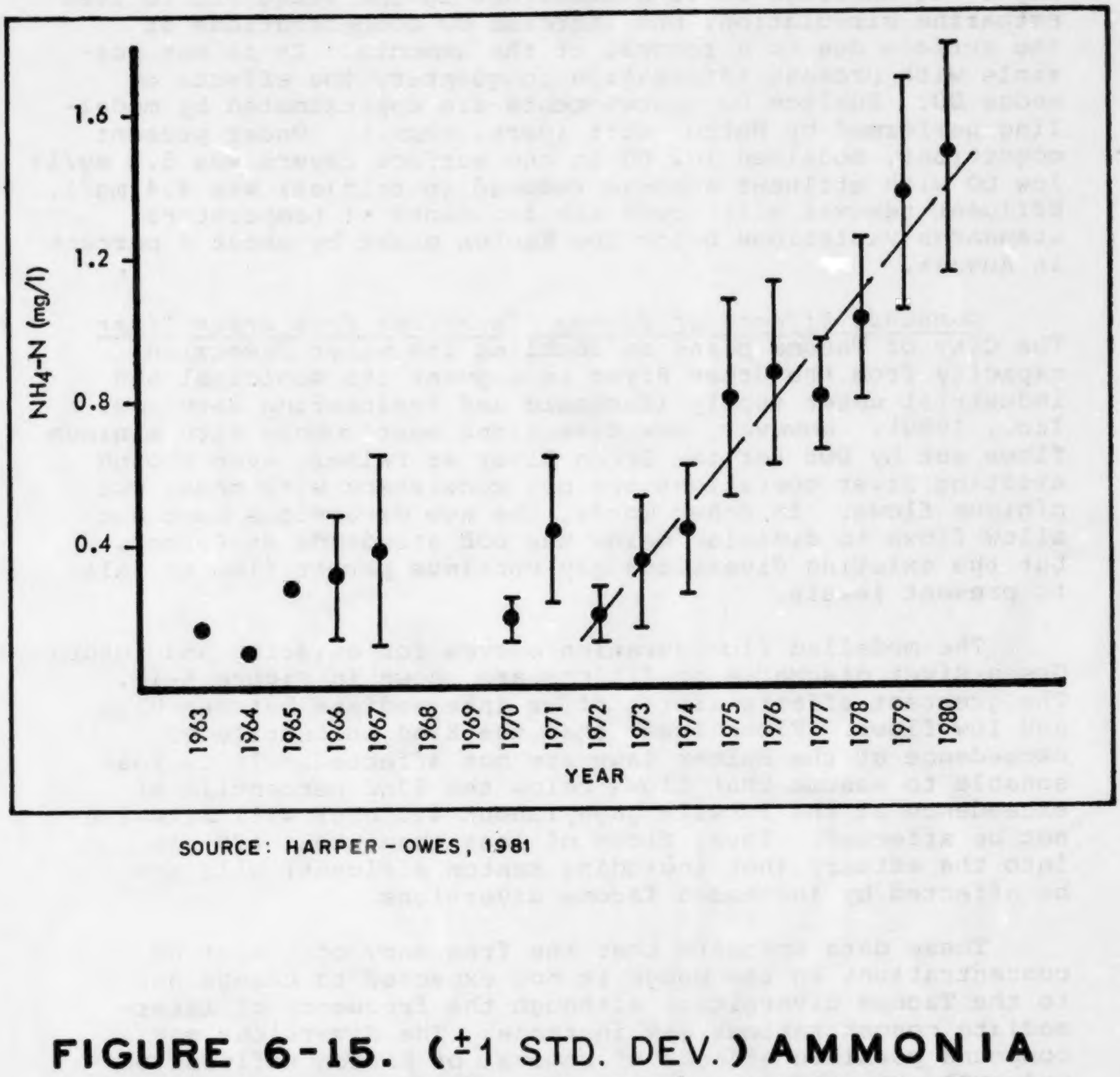
SOURCE: PRYCH, et al 1975

FIGURE 6-13. OBSERVED LONGITUDINAL PROFILES OF SALINITY, TEMPERATURE, AND DISSOLVED-OXYGEN CONCENTRATION IN THE DUWAMISH RIVER ESTUARY DURING THE LOW HIGH TIDE OF SEPTEMBER 13, 1968



FROM: SANTOS & STONER, 1972

FIGURE 6-14. MEAN DAILY FRESH-WATER INFLOW, TIDAL-PRISM THICKNESS, AND MINIMUM BOTTOM DO, AT STATION 7.7, JUNE-SEPTEMBER 1966



SOURCE: HARPER - OWES, 1981

FIGURE 6-15. (±1 STD. DEV.) AMMONIA CONCENTRATION AT 16th AVENUE SO., SURFACE DURING JUNE TO SEPTEMBER

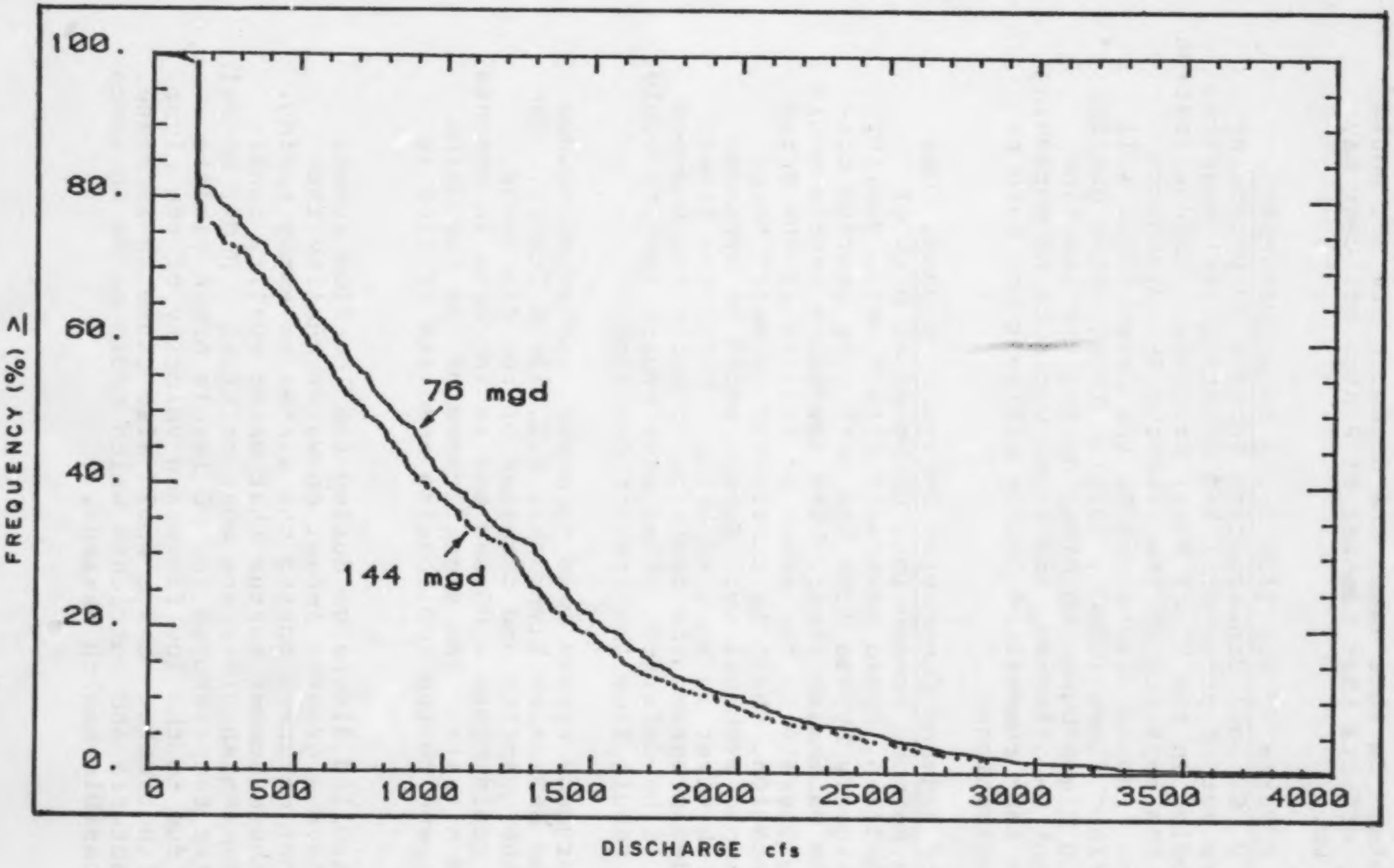
The water quality effects of removing the Renton effluent may be to decrease DO concentrations in the wedge due to less estuarine circulation, but increase DO concentrations at the surface due to a removal of the ammonia. It is not possible with present information to quantify the effects on wedge DO. Surface DO improvements are approximated by modelling performed by Metro staff (pers. comm.). Under present conditions, modelled low DO in the surface layers was 5.5 mg/l; low DO with effluent ammonia removed (nitrified) was 8.4 mg/l. Effluent removal will lower the incidence of temperature standards violations below the Renton plant by about 4 percent in August.

Combined Effects of Tacoma Diversions from Green River. The City of Tacoma plans on doubling its water diversion capacity from the Green River to augment its municipal and industrial water supply (Economic and Engineering Services, Inc., 1980). However, new diversions must comply with minimum flows set by DOE for the Green River at Palmer, even though existing river operations are not consistent with these DOE minimum flows. In other words, the new diversions must not allow flows to diminish below the DOE standards at Palmer, but the existing diversions may continue permit flow to fall to present levels.

The modelled flow duration curves for existing and future Green River discharge conditions are shown in Figure 6-16. The greatest effects are at flows intermediate between high and low flows. Flows lower than the 82nd percentile of exceedence at the Palmer gage are not affected. It is reasonable to assume that flows below the 82nd percentile of exceedence at the Tukwila gage (about 420 cfs) will likewise not be affected. Thus, flows of less than about 420 cfs into the estuary (not including Renton effluent) will not be affected by increased Tacoma diversions.

These data indicate that the frequency of lowest DO concentrations in the wedge is not expected to change due to the Tacoma diversions, although the frequency of intermediate concentrations may increase. The diversions may compound possible effects of removal of Renton effluent on wedge DO concentrations, but only under intermediate flow conditions and DO conditions. Under "worst case" flow and DO conditions (at flows less than 420 cfs), the diversions are not expected to affect flow or DO.

Combined Effects of Dredging Projects. The U. S. Army Corps of Engineers is proposing to dredge the Duwamish waterway to improve navigation. Harper-Owes (1981) found that, although wedge water residence time in the channel would be increased, effects on wedge DO would be minimal (0.05 mg/l), because oxygen demand in the wedge is mainly in the



FROM: CHARLES HOWARD & ASSOCIATES, 1980

FIGURE 6-16. FREQUENCY COMPARISON OF PALMER FLOWS FOR TACOMA DEMANDS OF 76 AND 144 MGD

bottom sediments. In this case, the dredging project would not worsen any effects that removal of Renton effluent may have on wedge DO.

Combined Effects of Eastside Green River Watershed Project. The U. S. Soil Conservation Service is proposing a comprehensive set of structural and nonstructural measures to reduce flooding in the Black River drainage. Channelization will increase the capacity of the existing P-1 discharge pump structure. Pumped discharges to the Green River will occur during flood flows (USSCS, 1970). Thus, water quality problems in the Green/Duwamish River during the low flow season would not be affected, and there would be no worsening of any effects that removal of Renton effluent may have on wedge DO concentrations.

Impacts of Redmond Connection Emergency Bypass. One feature of the Redmond connection, proposed as part of Alternatives A-3/A-5, could adversely affect water quality. This is an emergency bypass from the York pump station discharging to the Sammamish River. The emergency bypass would be designed to operate in the event of failure at the Totem Lake pumping station, which is considered by Metro to be an event of remote probability. Sewage would be bypassed to the Sammamish River in such an event. Under the final plan recommended program, the decision to build the Redmond connection would be deferred. Emergency bypass impacts would therefore not result from the present decision.

If an emergency bypass were to occur, untreated sewage would enter the Sammamish River near N.E. 124th Street. Depending upon the quantity and duration of the discharge, such an event could cause a DO sag and an increase in ammonia, phosphate, and nitrate. The significance of the reduction in DO would depend on the BOD loading and rate of flow in the river.

An uncontrolled discharge during the low-flow summer months would have a greater impact on water quality than if such an event occurred during the winter or early spring. It is during those summer months that water quality conditions in the Sammamish River are most critical. Under normal conditions water temperatures and DO levels often violate the standards due to the low flows and velocity of the river. A discharge of untreated sewage would also cause an increase in coliform bacteria and nutrients which could cause nuisance problems or possible health hazards.

If the discharge of untreated sewage into the Sammamish River was substantial enough, aquatic species would be adversely affected. The most likely effect of nutrient loading would be a stimulation of algae or rooted aquatic plants in the sluggish portions of the river and where the river enters Lake Washington. A substantial inflow of sewage could cause mortality to invertebrate and fish populations downstream of the York pump station.

The probability of an emergency bypass from the Redmond connection would be very low, because the York pump station would be provided with emergency power generation equipment.

Impacts of Alternative A-1 The following discussion evaluates the water quality impacts of Alternative A-1, which calls for installation of nitrification processes at the Renton plant and continued discharge to the Green/Duwamish River. Effluent dispersion, turbidity, un-ionized ammonia, DO, nutrients, heavy metals, chlorine toxicity, bacteria, toxic substances, and temperature are considered. When relevant, water quality improvements that would result from installation of advanced waste treatment under Alternative A-2 are noted.

Stream Flow. Hydrologic effects on summer low flows in the Green/Duwamish River at 72 and 99 MGD are shown in Figures 6-12. Monthly average 1-in-10-year low flows into the estuary would be increased by about 25 percent over present conditions if Alternative A-1 were implemented and year 2000 flows were 99 MGD.

Effluent Dispersion. Initial dilution of effluent from a continued Green/Duwamish River discharge would be poor. Presently, river-to-effluent dilution ratios in the Green/Duwamish River are as low as 4:1, and "slugs" of river flow can be as high as 58 percent effluent due to repeated passage of a block of water past the discharge area due to oscillating tidal action. A general rule-of-thumb guideline promulgated by the Washington Department of Ecology for an acceptable river-to-effluent dilution ratio is 20:1 (Bernhardt, 1980).

In the year 2000, with a minimum summer instream flow of 225 cfs and a Renton effluent flow of 100 MGD, the river-to-effluent ratio would be reduced to 1.5:1. Thus the river would average 40 percent effluent in the freshwater reach (about 6 miles) below the discharge during summer low-flow periods. "Slugs" of river water with effluent concentrations as high as 70 or 80 percent would probably exist.

The DOE (1980) has recently adopted rules calling for minimum flows of 300 cfs in the Green River at Auburn. Present low flows are about 200 cfs. A clear agreement on how additional flows will be gained is not defined.

Effluent residence time in Puget Sound for a Green/Duwamish discharge would probably be about the same as for Alternatives A-3/A-5 with an Alki Point discharge.

Turbidity. Recent data indicate that turbidity from the Renton plant has a "slight impact" on the Green/Duwamish River (Bernhardt, 1980), though no beneficial use is affected. Turbidity from an expanded plant with nitrification (Alternative A-1) would probably continue to have a slight affect. Alternative A-2 would probably produce a very clear effluent with minimal turbidity impacts due to the filtration process to be used.

Un-ionized Ammonia. The Renton discharge presently causes violations of the EPA 0.02 mg/l criterion in the Green/Duwamish River. Sampling in September 1979 showed values as high as 0.105 mg/l (Bernhardt, 1980).

Nitrification of the discharge into the Green/Duwamish River would reduce the effluent concentration of total ammonia nitrogen from present levels of about 15 mg/l to 1 mg/l. This decrease would probably eliminate the present violations of un-ionized ammonia criteria in the Green/Duwamish River.

The nitrification process in sewage treatment can be difficult to initiate and maintain. Any upset in the nitrification process could create toxic ammonia conditions in the Duwamish River or cause BOD and SS violations due to poor settling. Maintenance of only seasonal nitrification might be especially difficult.

Metro (pers. comm.) staff has performed calculations which show the effects of ammonia concentrations on fish under future conditions of effluent flow (99 MGD) if the effluent were not nitrified. These calculations also approximate the effects of nitrification process upset under Alternative A-1. The calculations show that at a river pH of 8.5, 95 percent of all coho salmon would be killed within 5 hours. Conditions of pH 8.5 occurred in 1974 and 1975, and pH values as high as 9.0 occurred in 1965 and 1966 (Welch and Trial, 1979). For unknown reasons, high pH values have not occurred in recent years. Future high pH values due to algal blooms certainly should not be ruled out.

Dissolved Oxygen. Adequate levels of DO are essential for fishes and other aquatic organisms to survive. The state DO standard in the tidally influenced reach of the lower Green/Duwamish River is 8.0 mg/l above the Black River (Class A). Below the Black River (Class B), the standard is 6.5 mg/l or 70 percent saturation, whichever is greater. DO standards are 6.0 mg/l in Elliott Bay and 7.0 mg/l in central Puget Sound.

Present discharges from the Renton plant are at least partially responsible for DO standard violations in the lower Green/Duwamish River. Organic matter from plankton blooms has been thought to be the source of oxygen demand which has caused oxygen sags (Welch, 1969; Welch, et al., 1972; and Welch, 1980; in Welch and Trial, 1979). Recent modeling studies (Yake, 1980) concluded that instream nitrification due to ammonia in the Renton effluent is a principal contributor to the DO sag. Carbonaceous BOD from the Renton plant apparently is relatively unimportant in the DO sag problem (Yake, 1980).

Figure 6-17 shows field DO concentrations taken in fall 1971, mathematical modeling curves simulating those conditions, and a mathematical modeling curve for DO under 1985 conditions (upriver flow - 210 cfs; effluent flow - 63 MGD) with no nitrification (effluent ammonia - 15.2 mg/l). The 1985 modeling results indicate that without nitrification, DO standards violations would be more severe than they are presently, with values as low as about 3 mg/l in the brackish water reach. Metro (pers. comm.) has performed calculations showing DO as low as 1.5 mg/l in the year 2000 without nitrification.

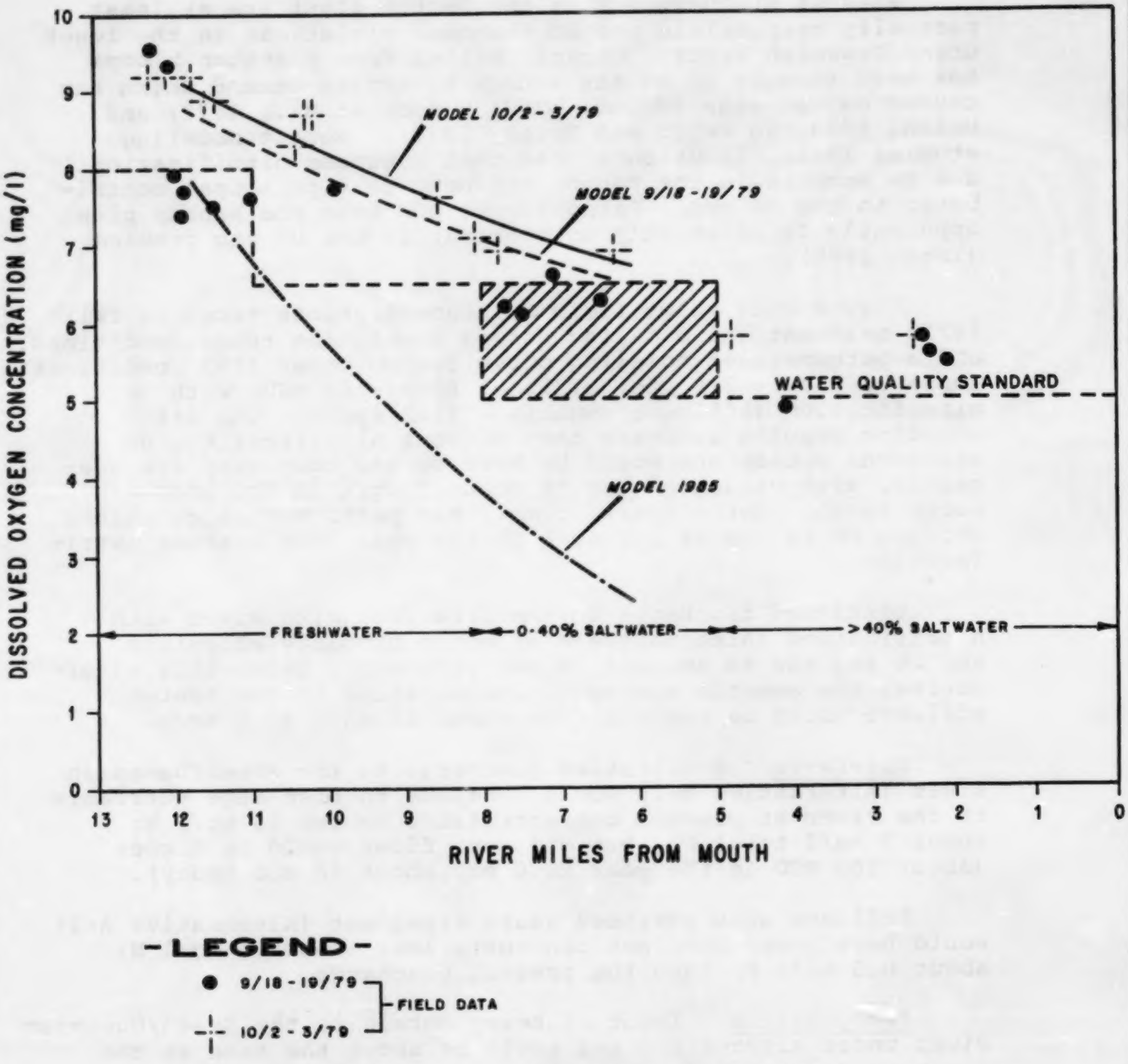
Continued discharge to the Green/Duwamish River with nitrification (Alternative A-1) would probably alleviate any DO sag due to ammonia in the effluent. Under this alternative, the ammonia nitrogen concentration in the Renton effluent would be reduced from about 15 mg/l to 1 mg/l.

Nutrients. A nitrified discharge to the Green/Duwamish River (Alternative A-1) would continue to discharge nutrients to the river at present concentrations (about 15 mg/l N; about 7 mg/l total P), but effluent flows would be higher (about 100 MGD in the year 2000 vs. about 40 MGD today).

Effluent with advanced waste treatment (Alternative A-2) would have lower nutrient concentrations (about 2 mg/l N; about 0.5 mg/l P) than the present discharge.

Heavy Metals. Input of heavy metals to the Green/Duwamish River under Alternative A-1 would be about the same as the input to Puget Sound under Alternatives A-3/A-5. Most of the quantities of heavy metals discharged to the river would be transported to Puget Sound by river flow. Some may settle out due to flocculation processes in the Duwamish estuary.

There have been no studies of effects of heavy metals on Duwamish River sediments or biota. However, DOE recently estimated heavy metals effluent limits which it believes are necessary for receiving water aquatic life



SOURCE: YAKE, 1980

FIGURE 6-17. FIELD DATA & MATHEMATICAL MODELING RESULTS FOR DISSOLVED OXYGEN IN GREEN-DUWAMISH RIVER

based on a 20:1 effluent dilution ratio. Table 6-7 compares these limits to existing discharge levels. Existing effluent levels considerably exceed the copper, mercury, and zinc limitations. Continued discharge under Alternative A-1 would continue this situation.

Advanced waste treatment (Alternative A-2) would reduce effluent concentrations of chromium, copper, and zinc by about half compared to the other alternatives (Metro, pers. comm.). Data for other metals are currently unavailable.

Chlorine Toxicity. Although dechlorination has been added to the Renton plant (1973), violations of the EPA (1976) water quality criterion of 0.002 mg/l have been found. In November 1979, values as high as 0.19 mg/l were found in the immediate vicinity of the discharge, and values as high as 0.07 mg/l were found about 1 mile downstream (Bernhardt, 1980).

Part of the chlorine toxicity problem may stem from the type of dechlorination system at the Renton plant. The plant has a "feedback" system, which, in order to function properly, cannot totally dechlorinate the effluent (DOE, pers. comm.).

Continued discharge to the Duwamish River could result in continued residual chlorine violations, unless better dechlorination or alternative effluent disinfection processes were installed. Metro is presently investigating different methods to improve the Renton plant's chlorination system.

Bacteria. Coliform standards are frequently violated in the lower Green/Duwamish River. Nonpoint source pollution and CSOs appear to be the main contributors. Continued Renton discharge to the Green/Duwamish River would probably not cause violations unless temporary failures in the chlorination process occurred.

Toxic Organic Substances. High levels of polychlorinated biphenyls (PCBs) have been found in Duwamish estuary sediments and fishes (Metro, 1979e). The major sources appear to be accidental spills, and nonpoint source runoff. The Renton plant is probably not a significant contributor of PCBs to the estuary. Continued discharge to the estuary would probably have little or no effect on PCB concentrations. There is little information on other toxic organic substances in the estuary, such as the effects of chlorinating the Renton effluent on the production of trihalomethanes and other organochlorine compounds. Metro is now starting a 3-year toxicant study which will investigate toxicant sources, treatment processes, and fates in the environment.

Table 6-7. Effluent Limits Estimated by DOE to Protect Water Quality and Average Existing Effluent Concentrations for the Renton Discharge

	Estimated Effluent Limits	Existing Effluent Average[1] (January 1978-September 1979)
Cadmium ug/l	1.6	< 4
lb/day	4.8	.18
Chromium ug/l	10.0	20
lb/day	30.02	5.9
Copper ug/l	8	30
lb/day	2.40	10.3
Lead ug/l	21	< 20
lb/day	6.31	3.8
Mercury ug/l	0.2	1.4
lb/day	0.06	0.47
Nickel ug/l	100	30
lb/day	30.02	8
Zinc ug/l	4	40
lb/day	1.20	12.2

[1] SOURCE: Metro, 1979d.

Temperature. State temperature standards are violated annually in the Duwamish River estuary and about 1 year in 2 in the lower Green River. The temperature and flow of the Renton effluent probably increases the frequency and magnitude of temperature standard violations. Continued discharge to the river under increasing effluent flow conditions would cause the frequency and magnitude of violations to increase in the future.

The temperature standards of the Washington DOE for the freshwater portion of the lower Green/Duwamish River are:

- Confluence of Black River upstream to the limit of tidal influence (Class A): temperatures shall not exceed 18.0°C (due to human activities). Temperature increases shall not, at any time, exceed $t=28/(T+7)$. When natural conditions exceed 18.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C.

- Confluence of Black River downstream to mouth (Class B): temperature shall not exceed 21°C due to human activities. Temperature increases shall not, at any time, exceed $t=34/(T+9)$. When natural conditions exceed 21.0°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C.

To determine the frequency of background water temperature violations and to evaluate the potential effects of the Renton discharge on the frequency and magnitude of present and future violations, river flow and temperature data, and Renton effluent flow and temperature data, were obtained and analyzed. The impact of present and year 2000 Renton effluent flows on river temperature was estimated based on conservation of heat between the effluent and river flows. This method is rough, and does not account for the dynamic processes of evaporation, shading, advection, conduction, radiation, and water velocity that occur in the water masses.

The time period selected for analysis was the month of August, for the years 1967, 1970, 1971, 1972, and 1974-1978. Daily Green/Duwamish River flow data were from the USGS gage at Tukwila. Daily maximum temperature data were from Metro station 311, at the same location. Daily temperature and flow data were obtained from Metro. The results of the temperature analysis are described below:

- Background temperature exceeded the 18°C standard on 77 percent of all August days.

- Addition of the Renton effluent caused the standard to be exceeded an additional 4 percent of all days, for a total of 81 percent.

- Effluent temperatures were generally 20-22°C. On days when the maximum background temperatures approached effluent temperatures, the effects of the effluent lessened. On 24 percent of all days, effluent temperature was actually cooler than background river temperature. These were generally days when background river temperatures exceeded 20-22°C.

- At year 2000 effluent flow levels, the standard would be exceeded an additional 12 percent of all days, for a total of 89 percent.

Impacts of Redmond Connection Emergency Bypass. Under Alternative A-1, Redmond connection emergency bypass discharges to the Sammamish River may occur. The impacts of these emergency discharges have been described in the water quality analysis of Alternatives A-3/A-5.

Impacts of Alternative B-1. Alternative B-1 includes dual treatment centers: the existing Renton plant, and a new Kenmore plant which would discharge to Puget Sound via a Richmond Beach outfall. This discussion will focus on how the impacts of dual treatment centers would differ from those of centralized treatment.

A Richmond Beach outfall 200 feet deep would probably have minimal effects due to low flow and the residential origin of the wastewater. Viewing Puget Sound as a whole, Alternative B-1 would achieve better dispersion of Renton service area effluent than the preferred program or Alternative A-1 because the effluent would enter from two widely separated sources rather than from a single source. Residence time of the diluted effluent in Puget Sound would be shorter for Richmond Beach than for any of the other discharge locations.

Another advantage to Alternative B-1, compared to Alternative A-1, is that of reduced water quality impacts on the Green/Duwamish River. Under Alternative B-1, year 2000 flows to the Green/Duwamish River would be 72 MGD, vs. 99 MGD for Alternative A-1. Even with this reduced flow, however, the water quality problems predicted for Alternative A-1 would occur with Alternative B-1, with a lesser degree of severity.

Impacts of No Project. Major adverse ammonia and DO impacts would occur in the Green/Duwamish River if no project is constructed and flows continue to increase. Without nitrification, un-ionized ammonia would probably exceed by far the EPA (1976) criterion of 0.02 mg/l. Welch and Trial (1979) found that, even at present levels of ammonia discharge, the un-ionized ammonia concentration would exceed 0.5 mg/l if pH were 9.0 and temperature were 20°C (conditions observed in the river in 1966).

DO levels in the estuary would decrease due to increasing ammonia and BOD loadings. BOD would especially increase because the present treatment facilities could not adequately treat year 2000 flows. Present effluent BOD concentration is about 15 mg/l at 36 MGD during dry weather conditions. This loading may increase to 30 mg/l by 1985 and would become considerably greater by the year 2000. The Renton plant could probably give essentially primary treatment to year 2000 flows. DO levels in the estuary during dry weather would probably approach 0, as they did in past decades before direct pollutant sources to the estuary were abated.

Aquatic Biology and Fisheries

Background. The biological resources of Puget Sound and the lower Green/Duwamish River and the known impacts of Metro wastewater facilities on those resources are summarized below.

Puget Sound. Puget Sound can be separated into intertidal (the shore between high and low tide lines), subtidal (the bottom below the low tide line), and pelagic (open water) habitats. The most definite effect of existing Metro discharges found to date on the biota of Puget Sound is a trend toward higher lead and mercury concentrations in mussels and clams near the West Point outfall; levels found were within toxicity guidelines (Schell, et al., 1977). Harman, Stober, et al. (1977) found no statistically significant effects of the West Point discharge on benthic invertebrate distribution, but their data do suggest some subtle changes in species composition. Campbell, et al. (1977) found no changes in phytoplankton production or standing stock due to the West Point discharge. The West Point discharge may lower the growth rate of subtidal kelp beds nearby, due possibly to suspended solids from the discharge causing lower light penetration (Metro 301h waiver application).

Miller, et al. (1977) found differences in species composition and abundance in the nearshore fish fauna between areas off West Point, Alki Point, and Point Pulley. They attributed the differences to habitat differences (eelgrass) not related to wastewater outfalls. In their study of demersal (bottom) fishes, high incidences of Dover sole, rex sole, ratfish and quillback rockfish near West Point were noted as possible beneficial effects of the West Point discharge. Acoustical (sonar) tracking surveys indicated no effect of the West Point outfall on pelagic fish distribution of abundance (Duxbury, 1976). The acute toxicity of the West Point primary effluent (LC50) ranged from 15.4 percent effluent in 96 hours for shiner perch to 50 percent effluent in 120 hours for shore crabs (Stober, et al., 1977).

Green/Duwamish River. The fish resources of the Green/Duwamish River system are of particular importance for this EIS. Chinook, coho and steelhead runs of the Green River system are among the largest in the Puget Sound region. Most of the steelhead and coho are of hatchery origin, whereas the chinook run is the second largest native run in Puget Sound, even though significant numbers of chinook are also of hatchery origin. Other less prevalent anadromous fish found in the Green River system include cutthroat trout, Dolly Varden char, chum salmon and pink salmon. The Muckleshoot Indian tribe propagates a small hatchery run of chum salmon (U. S. Fish and Wildlife Service, 1980).

The Department of Fisheries estimates the value of the approximately 220,000 salmon provided by the Green River system to sport and commercial fisheries at $4.4 million. Capital value of WDF hatchery facilities in the watershed is $4 million. The economic value of the Green River steelhead fishery was estimated to be $2-$3 million in 1976 (see Appendix C), and the Northwest Salmon and Steelhead Council estimates the value has tripled since then. Thus, total annual Green/Duwamish River fishery value is over $10 million. In addition, significant public expenditures are being made to operate and maintain the fish hatcheries in the system and to implement watershed improvement projects that maintain or enhance fisheries.

The river and estuary below the Renton plant discharge is a migratory route for anadromous species. Spawning habitats do not occur near or below the Renton outfall. The estuary may also be of importance as a rearing habitat for juvenile chinook salmon. Use of estuaries by anadromous salmonids is a relatively unresearched field. Myers (1980) found that chinook salmon use the Yaquina Bay, Oregon estuary for rearing.

Although water quality standards violations have occurred, no obvious effects on fish or other biota in the lower Green/Duwamish River directly attributable to the Renton discharge have been recorded at effluent discharge levels to date. Matsuda and Domenowske (1971) found that fish avoided areas in the estuary where DO approached 1 mg/l in the mid-1960s, but the low DO was due mainly to sources that have since been controlled. Low DO concentrations in summer are now about 4 mg/l, which is marginal for survival of salmonids.

Fujioka (1970) found that at DO levels as low as 3 mg/l, adult chinook salmon were still able to migrate through the Duwamish estuary. He did find a positive correlation between the amount of fall precipitation and the percentage of fish tagged in the estuary that make it to the Green River Hatchery. This may be an indication that low DO concentrations in the estuary affect the survival of fish upstream.

Buckley and Matsuda (1973) found that nondechlorinated Renton effluent was toxic (96-hour LC50) to fingerling coho salmon at 29 percent effluent, with a residual chlorine concentration of 0.20 mg/l. With chlorine removed, no mortalities occurred with effluent concentrations as high as 100 percent. Low pH levels in this study prevented un-ionized ammonia from contributing to toxicity.

Impacts of Alternatives A-3/A-5. In the discussion below Alternatives A-3/A-5 are assessed for potential impacts on algal production, invertebrates, and fisheries.

Algal Production. Since nitrogen is limiting to algal growth for brief periods in some years in central Puget Sound, effluent discharge under Alternatives A-3/A-5 may have occasional, local biostimulatory effects. These effects would not be adverse, since algal standing crop levels in Puget Sound do not presently approach nuisance levels. Small increases in algal production may actually benefit Puget Sound fisheries due to a greater primary food source. Growth of kelp may be lowered near the discharge. However, effects would be lower than at West Point, since suspended solids concentration will be lower.

Invertebrates. Present discharges at West Point have not created any measured significant adverse changes in invertebrate distribution or abundance, though the data base is weak. A Renton discharge to Puget Sound will probably likewise have little effect on invertebrate occurrence. Removal of the Renton discharge from the Green/Duwamish estuary would alter the late summer and fall distribution of salt-sensitive estuarine zooplankton species in response to the altered salinity gradient.

A discharge to Puget Sound could cause small increases in heavy metals accumulation in mussels and clams near the outfall, as found near West Point. However, the heavy metals in Renton effluent would be lower than in the West Point effluent because there are fewer industrial sources in the Renton service area, and because the Renton plant has a higher degree of treatment.

Fisheries. The presence of a Renton effluent plume in Puget Sound is not expected to adversely affect fish distribution, based on studies of fish near the West Point plume (Duxbury, 1976). The diffuser may actually attract some species, as does the West Point diffuser (Miller, et al., 1977).

Removal of Renton effluent from the Green/Duwamish River would benefit fisheries in the river, as compared to Alternative A-1, because risks of process upset, and the contribution of the Renton plant to temperature standards violations, would be removed. Potential for any subtle cumulative effects, possibly caused by small concentrations of toxic substances in the effluent, would also be removed. Migration of adult salmonids and salmon migration and rearing of juvenile salmonids would be safeguarded. Rearing of juveniles in the estuary is of particular concern, since the fish would be exposed to the effluent for a longer time period than for migration.

Relatively little is known about the needs of salmonids rearing in estuaries, as compared to their needs when rearing in freshwater streams. Increasing attention is being focused on estuaries. Of the salmonid species found in the Green/Duwamish system, chinook salmon and chum salmon may be especially dependent on the estuary for rearing due to their relatively short rearing life stages in freshwater stream areas.

Effluent removal from the river would decrease the frequency of temperature standards violations in August (the most frequent month of violations) by about 4 percent from present conditions (a decrease from 81 percent to 77 percent), or by about 12 percent compared to Alternative A-1 at 99 MGD (a decrease from 89 percent to 77 percent). The temperature increases caused by the effluent over and above ambient, with ambient in the vicinity of 18-20°C, are presently about 0.6-0.7°C, and would be about 1.2-1.4°C with 99 MGD of effluent (Alternative A-1) (Metro, pers. comm.). It is not known if this level of effect would actually alter the timing of salmon migrations.

Impacts of Alternative A-1. In the discussion below, Alternative A-1 is assessed for potential impacts on algal production, invertebrates, and fisheries, and relevant improvements that would result from advanced wastewater treatment under Alternative A-2 are noted.

Algal Production. Renton effluent nutrients probably do not control algal growth in the Duwamish estuary (Welch, 1969; Welch, et al., 1972; and Welch, 1980 in Welch and Trial, 1979). Nutrients from the plant under Alternative A-1 will therefore probably have no effect on algal production in the Duwamish estuary, and nutrient removal under Alternative A-2 may be of limited value. However, algal-nutrient relationships in the estuary are not well understood.

Invertebrates. There have been no studies of the effects of the Renton discharge on invertebrates in the Green/Duwamish estuary. It is not known whether continued discharge would have any adverse effects on invertebrates.

Fisheries. Fish migration could be affected by Renton effluent impacts on dissolved oxygen, temperature, and toxicity. Each of these factors is reviewed below.

Present DO levels in the Duwamish estuary are as low as 4 mg/l in summer (Welch and Trial, 1979), a level which can effectively block the upstream migration of adult salmonids. The DO sag in the estuary has been attributed largely to ammonia from the Renton plant (Yake, 1980). This would cease to be a concern under Alternative A-1 due to nitrification.

A second concern regarding the Renton discharge to the Duwamish is high water temperatures blocking the upstream migration of adult salmonids in late summer and early fall. Temperature standards would be violated about 77 percent of all days in August without a Renton discharge to the river, but the discharge would increase the frequency of violations to about 89 percent of all August days in the year 2000. It is not known whether present delays in upstream migration of chinook salmon in late summer are caused by low DO concentration, high temperature, or some other flow-related factor. Therefore, the incremental thermal effects of discharge to the Green/Duwamish River on migratory salmon cannot be predicted at this time.

Effluent toxicity could also affect fish migration. The main acute toxicity component of the Renton effluent is residual chlorine. Despite dechlorination to 0.25 mg/l, the Renton plant discharge results in chlorine levels as high as 0.19 mg/l in the immediate vicinity of the discharge, and 0.07 mg/l about 1 mile downstream (Bernhardt, 1980). These concentrations approach levels toxic to fish. The lethal (96-hour LC50) concentration to coho salmon fingerlings of residual chlorine in the Renton effluent was found to be 0.20 mg/l in 29 percent effluent (Buckley and Matsuda, 1973). The reported value of 0.20 is actually a 48-hour LC50, since no fish died after 48 hours in the tests.

Under Alternative A-1 adverse effects on fish due to chlorine toxicity may occur if more effective dechlorination is not implemented. If residual chlorine continues to be discharged in present concentrations, future river and effluent flow conditions may result in "slugs" of effluent in the river with chlorine concentrations of 0.20 mg/l or above in the immediate vicinity of the discharge. Metro is presently looking into ways to lower the residual chlorine concentration in the Renton effluent. Ammonia toxicity would not be a long-term problem because nitrification would be in the Renton treatment train. However, ammonia would be lethal to salmon during periods of high pH if the nitrification process broke down.

High incidences of fin erosion and liver tumors have been found in starry flounder and English sole in the Duwamish estuary. The causes of these diseases are unknown. Fin erosion diseases have been associated with areas of heavy wastewater discharge in the ocean off southern California and in the New York Bight (Miller, et al., 1977). In addition, Metro studies (pers. comm.) have found that long-term (91-day) exposure of coho salmon to 30% Renton effluent produced a dysfunction of carbohydrate metabolism unrelated to chlorine or ammonia; such effects could also occur to resident non-anadromous fish living in the estuary.

Miller, et al. (1977) suggests that the diseases are actually two manifestations of a single systemic disease caused by one or more chemical contaminants, possibly PCBs. The Renton discharge has not been associated with high levels of PCBs. Continued discharge to the Green/Duwamish River is not expected to contribute to adverse pathological effects on fish.

If impacts on the Green/Duwamish fisheries do occur, the effects may compound over a number of years to severely reduce a portion of the fish stocks.

Impacts of Alternative B-1. The aquatic biology and fisheries impacts of Alternative B-1 would stem from water quality impacts of the alternative. As previously discussed, the Richmond Beach outfall is unlikely to create measurable adverse water quality impacts in Puget Sound due to low flow and the residential origin of the wastewater. Therefore, no corresponding biological impacts in Puget Sound are expected.

Impacts on aquatic organisms and fisheries in the Green/Duwamish River under Alternative B-1 would be similar in kind to those previously described for Alternative A-1. Because effluent flows to the river would be reduced under Alternative B-1, potential adverse biological impacts would be less severe than under Alternative A-1.

Impacts of No-Project. Major adverse impacts on the fishery of the Green/Duwamish River may occur if no project is built and new sewer hook-ups are not restricted. The effects would stem from the water quality impacts on the river. Un-ionized ammonia would exceed levels toxic to coho salmon during periods of high pH due to algal blooms. DO levels would be far below levels necessary for diverse populations of fish, especially salmon and steelhead. The continued existence of the fishery would be threatened. The most severe effects would occur during the low flow periods of summer and early fall.

Mitigation Measures. This section presents mitigation measures for the long-term water quality and biological impacts of Metro's wastewater management alternatives. Mitigation measures for short-term water quality impacts are discussed in the following section.

Oceanographic and Biological Studies. Although the preceding impact analysis concludes that there is little possibility that Renton plant discharge to Puget Sound will adversely affect the sound's water quality or ecology, additional scientific work is necessary to verify this conclusion and to design the outfall so as to minimize impacts on the sound and its beaches. Additional detailed oceanographic studies are proposed by Metro to determine optimal outfall alignment, depth of discharge, and diffuser design parameters, and to predict plume locations, mixing, and dilution. Metro has also proposed to undertake biological studies to establish baseline data and monitor biological responses once the outfall is in operation. These oceanographic and biological studies, which are described in further detail in the Wastewater Management Plan, are necessary to more precisely predict and mitigate the impacts of Renton plant discharge to Puget Sound. In particular, the oceanographic studies should include determination of shoreward travel times of surface currents during times of winter southwesterly winds.

Monitoring. Metro will conduct an ongoing water quality monitoring program in the vicinity of the outfall. If this program or any other Puget Sound study finds evidence that the discharge is producing significant adverse effects, there are several actions Metro can take in response, such as extending the outfall, redesigning the diffuser, increasing treatment levels, requiring stricter source controls or pretreatment, and foregoing additional treatment plant expansions.

Heavy Metal and Toxic Substances Impacts. Although the contribution of heavy metals to Puget Sound from the Renton plant will be small compared to other sources, control of heavy metals and toxic substance discharges is desirable because of the potential for long-term irreversible impacts. Metro has adopted an industrial pretreatment program and is currently pursuing a comprehensive program concerning heavy metals and other toxic constituents in its wastewaters. The toxicant study will identify toxic constituents and sources within Metro's service areas, propose pretreatment alternatives, propose centralized treatment alternatives, and research the distribution, inputs and chemical and biological fates of toxicants in Puget Sound.

Chlorine Toxicity. Chlorination and dechlorination are the final steps of wastewater treatment under Alternatives A-3/A-5. Improvements are needed to the Renton plant's chlorination system to prevent toxicity problems, and are proposed as part of Alternatives A-3/A-5. Metro has proposed near-term improvements in the chemical feed system to reduce residual chlorine levels in Renton effluent. Once the tunnel and outfall to Puget Sound is operational, it may be used for chlorine contact. The Wastewater Management Plan indicates chlorine doses can be reduced compared to present practices because contact time will be increased; if the contact time is long enough, chlorine residuals may decay, thereby reducing or eliminating sulfur dioxide requirements for neutralization.

Short-Term Water Quality and Aquatic Biology Impacts During Project Design and Construction.

Impacts. Under any of the alternatives, short-term deteriorations in Green/Duwamish River water quality will occur between the present time and 1985, when the planned additional facilities are on-line. The expected short-term impacts, and mitigation measures for these impacts, are discussed by Metro in its Wastewater Management Plan and summarized here.

Metro projects that during the 1980-1985 construction period, average wet weather flows will increase from 41 to 50 MGD, excluding the Redmond connection flows. If the Redmond connection were brought on-line by 1985, 4 MGD would be added.

As noted in the previous analysis of water quality impacts, water quality standards in the Green/Duwamish River downstream of the Renton discharge are being violated for temperature, DO, ammonia and chlorine. Increased flows between 1980 and 1985 will increase the frequency and degree of these violations (with the exception of chlorine, which is expected to be brought down to acceptable levels in the near future). In addition, the DOE recommendations for 20:1 effluent dilution will continue to be exceeded.

The short-term deterioration in water quality would probably cause adverse changes in the biology of the Green/Duwamish River. No effects on fish or other biota directly attributable to the Renton discharge have been measured at current discharge volumes, but particular concerns exist regarding Renton effluent impacts on ammonia toxicity and DO, as they affect salmonid rearing and migration, other fish species, and the river's ecology in general. Further increases in ammonia and decreases in DO will create increased risks that fisheries will be adversely affected.

Mitigation Measures. Metro has identified several measures currently available to reduce BOD and SS levels during periods of excessive flows. These measures are 1) storage of excess flows in the Renton plant influent sewer, 2) "stressing" of the secondary treatment process, 3) alum addition, and 4) giving primary treatment to excess flows, and blending the secondary effluent prior to discharge.

These measures, however, address neither the ammonia toxicity problem nor the oxygen demand from the un-ionized ammonia. Metro has identified two groups of mitigation measures for these problems: measures to be implemented, and additional measures available. These mitigation measures are listed in Table 6-8, which also presents Metro's evaluation of the effectiveness and costs of each measure. Metro believes that, although few of these measures alone can solve the ammonia problem, combinations of these measures can adequately protect fishery resources over the short term.

Resource Use

Energy Use

Each long-term alternative significantly increases energy consumption for study area wastewater management, primarily due to the treatment stage of each alternative. Other energy uses are for sludge treatment, influent pumping stations, effluent pumping (for marine discharges) and disposal (for land application). The overall energy requirements of each of the 15 initial alternatives are tabulated in Table 6-9. Also shown are the energy requirements for treating each million gallons of wastewater.

From Table 6-9 it appears that of the initial 15 alternatives, Alternatives B-3, B-4, or B-5 offer the least energy consumption, using about 66,000,000 Kwh per year, or 1,830 Kwh/mg, primarily due to the lower degree of treatment required compared to nitrification and AWT alternatives. Insufficient information is available to determine which of the three is the most energy efficient. The highest energy requirement (4,070 Kwh/mg) is for AWT and discharge to the Duwamish River (Alternative A-2); this high energy cost can be attributed to the high degree of treatment and the high energy requirements for recalcination of lime sludge and regeneration of activated carbon.

Of the four final alternatives, Alternative B-1 has the lowest energy requirement, 2,080 Kwh/mg. Alternative A-1 has the highest energy requirement, 2,710 Kwh/mg. The no-project alternative would not change energy consumption above the present rate of increase.

Table 6-8. Interim Measures to Reduce Ammonia Loading to the Duwamish River

Measures to be Implemented	Potential Reduction of Current Ammonia Load	Capital Costs to Metro	Incremental O/M Costs to Metro	Comments
1) Fast Track Implementation of Plant Expansion	high	high	moderate	Implementation of this alternative would require 3 to 4 years.
2) Diversion of Flow via Sludge Force Mains	slight	slight	slight	Modifications currently being made to implement this diversion.
3) Reduced Summer Flushing	slight	none	slight	Requires implementation of some form of effluent diversion to achieve a slight amount of ammonia removal.
4) Industrial Source Control	high	none	none	Some industrial discharge permits have been renegotiated to eliminate ammonia discharges.
Additional Measures Available				
1) Interim Nitrification with Existing Facilities	moderate	moderate	high	This alternative could seriously impact treatment plant operations thus jeopardizing overall effluent quality.
2) Construct Special Nitrification Facilities				High capital cost alternatives which could completely remove ammonia in the effluent.
a) Ammonia Stripping	high	high	high	
b) Roughing Filters	high	high	high	
c) Breakpoint Chlorination	high	high	high	
3) Use of Kent/Auburn Lagoons	moderate	moderate	moderate	Use of this alternative is dependent upon the availability of the existing Kent and Auburn lagoons.
4) Diversion of Flow via Riverton/Renton Pump Station	moderate	high	moderate	High capital cost project which could allow up to 10 mgd to be diverted to West Point. Would take 2 years to implement
5) Diversion of Effluent for Land Disposal	high	high	high	Large amount of land area required near the treatment facility may not be available.
6) Local Agency Infiltration Control	slight	none	none	Requires implementation of some form of effluent diversion to achieve a slight amount of ammonia removal.
7) Water Conservation	slight	none	none	Requires implementation of some form of effluent diversion to achieve a slight amount of ammonia removal.
8) Interim River Flow Augmentation	high	none	unknown	The success of this alternative is dependent upon the cooperation of the U.S. Army Corps of Engineers in operating the Howard Hanson Dam, and the availability of stored water.
9) Fisheries Resource Protection	none	moderate	moderate	Requires the cooperation of the Department of Fisheries.
10) Sewer Moratorium	none	none	none	The effectiveness of this alternative is questionable. If implemented its impact would be in the reduction of future ammonia levels.
11) Eliminate Septage Disposal	slight	moderate	moderate	This measure significantly disrupts current septage disposal practices yet only reduces ammonia loading to the plant by 1.3%.

SOURCE: Metro, 1981.

Table 6-9. Estimated Energy Requirements for Proposed Alternatives

Alternative	1,000 Kwh/yr*	Kwh/mg**
Basic Program		
A-1	98,000	2710
B-1	75,000	2080
C-1	76,300	2080
Basic Program and Nutrient Removal at Renton		
A-2	137,000	3790
B-2	104,000	2880
C-2	105,300	2870
Basic Program-Renton discharge at Point Pulley		
A-3	87,000	2410
B-3	66,000	1830
C-3	67,300	1830
Basic Program-Renton discharge in Elliott Bay		
A-4	87,000	2410
B-4	66,000	1830
C-4	67,300	1830
Basic Program-Renton discharge at Alki Point		
A-5	89,000	2460
B-5	68,000	1880
C-5	69,000	1880

*Current energy use at Renton plant is approximately 24,000,000 Kwh/yr (see Figure 2-12).
**mg = million gallons

Source: Metro, 1980h.

Energy cost is expected to be the highest portion of the O&M costs, and since energy use is high for each alternative, energy efficiency is expected to be a critical design criterion. Maximum use of digester gas recovery is to be pursued in the alternative selected, and energy-efficient processes and equipment are anticipated for selection during the design of the selected project.

Chemical Use

The evaluation of long-term alternatives should consider the required use of chemicals. Especially important are lime and activated carbon, which both require regeneration. As energy costs rise, so will the cost of using these chemicals. The use and recalcination of lime not only add a cost for direct chemical purchases, but also greatly increases the on-site energy use. Activated carbon also creates high costs for energy because of the periodic regeneration requirements. Therefore, alternatives which use lime and activated carbon are substantiallly more energy-intensive and expensive than other alternatives, other things being equal.

Table 6-10 displays the chemical requirements for each of the 15 initial alternatives. Lime, methanol and activated carbon are only used in the AWT proposals (Alternatives A-2, B-2, C-2) which discharge to the Duwamish River; the AWT alternatives require more chemical use than any of the other proposed alternatives. The marine discharge alternatives do not require dechlorination for discharge and therefore require the least amount of chemicals. The alternatives which have nitrification and discharge to the Green/Duwamish River require sulfur dioxide to dechlorinate the effluent. All alternatives require chlorine to disinfect the effluent before disposal. The six small satellite plants, under Alternatives C-1 - C-15, require more chlorine because the risk of human contact is greater. Ferric chloride is used to enhance dewatering of solids processed at all proposed plants.

If the AWT alternatives were to be selected, careful consideration should be given to large bulk purchases (allowing lower per unit cost) and energy efficient methods of lime and activated carbon treatment. Methanol cost may not rise as fast as the cost of other chemicals because of the fuel potential and possible greater future supplies of methanol.

Of the four final alternatives, Alternatives A-3/A-5 require the least amount of chemicals. Therefore, the risk of cost escalation due to increased energy costs and chemical use is the lowest.

Table 6-10. Estimated Chemical Requirements (tons per year)

Alternative	Lime[1]	Methanol[2]	Activated Carbon[3]	Chlorine[4]	Sulfur Dioxide[5]	Ferric Chloride
Basic Program						
A-1	—	—	—	760	240	872
B-1	—	—	—	550	170	771
C-1	—	—	—	580	170	771
Basic Program and Nutrient Removal at Renton						
A-2	13,550	6,870	540	760	240	649
B-2	9,860	4,990	390	550	171	568
C-2	9,860	4,990	390	580	171	568
Basic Program-Renton discharge in Puget Sound						
A-3, 4, 5	—	—	—	760	—	791
B-3, 4, 5	—	—	—	550	—	859
C-3, 4, 5	—	—	—	580	—	859

Assumptions

1. 750 pounds lime/million gallons (lb/mg)
2. 380 lb methanol/mg
3. 30 lb activated carbon/mg (make-up)
4. 42 lb chlorine/mg for discharge to water
   83 lb chlorine/mg for discharge to land
5. 13 lb sulfur dioxide/mg for discharge to Duwamish River only

SOURCE: Brown and Caldwell, pers. comm., 1980.

Mitigation Measures

In the design and operation of the selected alternative efforts should be made to minimize energy and resource use. This is an important principle, one which Metro is committed to, from both resource conservation and cost standpoints.

Growth-Related Impacts Resulting from Staging of Alternatives

Background

Most of the growth-related impacts of the long-term wastewater management alternatives for the study area are common to all the alternatives, and these impacts are assessed in Chapter 7 of the EIS. However, each of the alternatives has one or more nonmodular facilities; the sizing and staging of these nonmodular facilities has important growth implications.

As a general rule, in order to minimize potential growth-inducing or growth-inhibiting effects of wastewater facilities, it is desirable to design the facilities so that they can be added to in modules, allowing flexibility in response to changes in population projections or land use plans. However, some facilities are considered nonmodular, because adding additional modules of capacity is not cost-effective or creates major adverse construction impacts.

Interceptor sewers are a common example of a nonmodular facility. Trade-offs always exist in the sizing of interceptors between providing a large initial excess capacity, which may be cost-effective and minimize construction disruptions, and providing a smaller initial excess capacity, which creates less risk of growth inducement. EPA cost-effectiveness analysis guidelines (40 CFR, Part 35, Subpart E) provide that federally-funded interceptor sewers should not be designed for a staging period of longer than 20 years, unless the long-term growth projections are consistent with planned land uses in 208 plans and the longer staging period would reduce both primary and secondary environmental impacts. Although these guidelines do not apply if the interceptor is locally-funded, they do indicate EPA's concerns related to adverse impacts of interceptor staging periods longer than 20 years.

In the analysis that follows, the flexibility of each long-term alternative is assessed by considering the extent to which it relies on nonmodular facilities. In addition, for Alternatives A-3/A-5, potential impacts of sizing the Renton outfall tunnel and Redmond connection for 50-year flows are discussed.

Impacts of Alternatives A-3/A-5

Overall Flexibility. Because Alternatives A-3/A-5 involve the construction of several nonmodular facilities (Redmond connection, North Creek/Hollywood connection, and Renton outfall tunnel), they are probably the least flexible of any of the long-term alternatives being considered, other than the no-project alternative.

Potential Impacts of the Renton Outfall Tunnel and Redmond Connection. The method for sizing and staging components of Alternatives A-3/A-5 is described in Section D6j of the companion document to the Wastewater Management Plan. The basic approach used was to select the staging period which has the least cost present worth. Based on this approach, it was decided to expand the Renton treatment plant into two phases to meet flows projected for the year 2000, but to construct the Renton outfall tunnel and Redmond connection in single stages to meet projected year 2030 flows.

Peak flow projections used to size the Renton outfall tunnel and Redmond connection are shown in Table 6-11. Methods for developing the year 2030 flows derive from the long-term population projections in Metro's 1958 comprehensive plan.

Constructing the Renton outfall tunnel and Redmond connection in single, 50-year stages results in the least present worth cost, delays the potentially major impacts of constructing new or parallel facilities, and reduces the risks of running out of capacity if PSCOG's population projections err on the low side. This approach also has several disadvantages. First, projections beyond 20 years, such as those underlying the calculations of year 2030 peak flows, are not recognized by land use planning agencies or PSCOG; this means that the Redmond connection and tunnel/outfall are being planned in advance of land use planning for the study area. Second, if the Metro year 2030 population projections err on the high side, unneeded capacity would be funded and built. Third, unless a "bottleneck" exists elsewhere in the sewerage system, capacity will be available for 20-year flows in excess of those based on the PSCOG population projections. The Renton treatment plant capacity acts as a bottleneck for the Renton outfall tunnel, but it does not appear that such a bottleneck exists for the Redmond connection, other than the York and Totem Lake pump stations. If Redmond connection flows were to exceed the PSCOG-based flow projections, potential treatment plant capacity problems could result.

Table 6-11. Long-Term Peak Flow Projections Used to Size Renton Outfall Tunnel and Redmond Connection (MGD)

Facility	1980	2000	2030
Renton Outfall Tunnel[a]	144	238	325
Redmond Connection[b]	16.9	40.4	75.0
- North Lake Sammamish Service Area	8.2	17.7	38.0
- North Lake Washington Service Area	8.7	22.7	37.0

[a] SOURCE: Metro, 1980h.

[b] SOURCE: Metro, 1980h.

Under the recommended program in Metro's final plan, the decision whether to construct the Redmond connection would be deferred, but the tunnel/outfall would still be designed to accommodate 50-year flows from the sewered portions of the entire study area as in Alternatives A-3/A-5. If flows from the north part of the study area are not diverted to the Renton plant in the future, capacity considerably in excess of 50-year needs would exist in the tunnel/outfall.

Impacts of Alternative A-1

This alternative offers slightly more flexibility than Alternatives A-3/A-5 because it does not require construction of an outfall and tunnel to the sound. The Redmond and North Creek/Hollywood connection would still be required.

Impacts of Alternative B-1

This alternative is more flexible than Alternatives A-3/A-5 because construction of the Kenmore treatment plant eliminates the need for the Redmond and North Creek/Hollywood connection. The Kenmore treatment plant is more capable of responding to changes in population projections or land use plans in the north part of the study area than are the nonmodular effluent lines; the Kenmore treatment plant is thus less likely to be growth-inducing or growth-inhibiting. However, a tunnel and outfall to Richmond Beach would be required under this alternative, raising the same sorts of sizing and staging concerns as presented by the Renton outfall tunnel.

Impacts of No Project

The no-project alternative is less flexible than any of the long-term alternatives being considered by Metro, because it is the least responsive to future growth. By not expanding the Renton plant, capacity would not be available to serve planned-for growth within the study area.

Mitigation Measures

The main adverse impacts identified in this section are the disadvantages associated with sizing and staging the Renton outfall tunnel and Redmond connection for 50-year peak flows. The relationship between staging of sewerage capacity and growth has been recognized in existing mitigation measures such as King County's Sewerage General Plan and Metro Resolution 2933 (see Chapter 7). Two additional mitigation measures are available.

Reduce Staging Period. The staging period for the Renton tunnel outfall and the Redmond connection could be reduced from 50 years to 40 years or 20 years. The disadvantages of this measure are that the potentially major construction impacts of parallel facilities would occur sooner, that a shorter staging period would have a higher present worth cost, and that capacity limits may be reached sooner than expected if PSCOG's population projections err on the low side.

Base 50-Year Flow Projections on Land Use Plans or PSCOG Forecasts. Metro, local governments, and PSCOG could work together to arrive at 50-year population and peak flow projections that are more firmly based on current land use policies. For example, PSCOG in 1978 developed very long-term (to the year 2075) population projections for Seattle water planning (Seattle Water Department, 1980). Perhaps these projections could be disaggregated by drainage basin for 50-year flow projections. To the extent this is possible, the potential growth-inducing impacts of the outfall tunnel and Redmond connection would be reduced. In its Wastewater Management Plan, Metro suggests that local agencies review the 50-year flow projections; perhaps a more formalized process of local agency and PSCOG input to the 50-year projections could be implemented.

Recreation Opportunities

Pursuant to EPA's facilities planning requirements, Metro has prepared a comprehensive assessment of recreation opportunities associated with wastewater treatment alternatives; this assessment appears in Section J of the companion document to the Wastewater Management Plan (Metro, 1980h). Based on this assessment, Metro has identified several recreation opportunities for possible eventual implementation. These opportunities, which are listed in Table 6-12, apply largely to the preferred program, although some could be implemented with Alternative A-1 or B-1 as well; recreation opportunities additional to those shown in Table 6-12 would be created by construction of the Kenmore treatment plant and the tunnel/outfall to Richmond Beach under Alternative B-1.

All the long-term wastewater management alternatives create the potential for additional recreation opportunities within the study area. Recreation benefits include progress toward the Clean Water Act's "fishable-swimmable" water quality goal, in addition to the opportunities shown in Table 6-12.

Table 6-12. Potential Recreation Opportunities Provided by Long-Term Alternatives

Recreation Opportunity	Preferred Program	Alternative A-1	Alternative B-1[a]	No-Project
Interconnection of the Tolt Pipeline Trail, Sammamish River Trail, and the Bridle Crest Trail via an adjacent linkage of a trail system provided through the North Creek/Hollywood connection and Redmond connection. These trail linkages provide direct and indirect access to the water bodies of Totem Lake, Sammamish River and Lake Sammamish.	x	x		
Through Renton treatment plant expansion, provisions are possible for a public information network located throughout the plant components as an environmental education feature.	x	x	x	
Potential trail access to the Green/Duwamish River adjacent to the existing Renton treatment plant site, with linkage to the Interurban Trail System and Fort Dent Athletic Center.	x			
Potential design features for proposed pump stations to include provisions for multiple use, e.g., designing pump stations to include an observation platform.	x			
Mitigation of disruption to existing park facilities by integrating existing park amenities with a potential trail system provided by outfall lines.	x			

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[a] Additional recreation opportunities would also be created by construction of the Kenmore treatment plant and the tunnel/outfall to Richmond Beach.

SOURCE: Metro, 1980h.

Metro (1980h) notes that the recreation opportunities listed in Table 6-12 have the potential for eventual implementation, depending on precise project definitions, site locations, and alignments. Metro recommends continued coordination with EPA, the Heritage Conservation and Recreation Service, the King County Parks Department, the Seattle Parks and Recreation Department, and other local parks and recreation agencies, in order to realize the recreation opportunities identified as part of wastewater management planning.

It should be noted that several of the alternative tunnel/outfall alignments will have short-term adverse impacts on park use. For example, the recommended program would disrupt use of Seahurst Park during the construction period. Long-term impacts of the tunnel/outfall on Seahurst Park are not expected to be significant (see Chapter 5).

Chapter 7

SECONDARY IMPACTS COMMON TO ALL ALTERNATIVES

Introduction

This chapter assesses the growth-related secondary environmental impacts common to all long-term wastewater management alternatives considered by Metro. These impacts derive from the common population and land use projections used to project wastewater flows for all the alternatives. Growth-related impacts are of major importance for this EIS, since the Lake Washington/Green River Basins study area represents the major growth area for metropolitan Seattle over the next 20 years.

EPA policies require the agency to consider the secondary environmental impacts of wastewater projects receiving federal construction grants. These secondary impacts are primarily caused by the growth which expanded wastewater facilities are typically constructed to accommodate. The secondary impacts of a project may often be more significant than the project's direct impacts.

Because Metro has relied on local land use policies to designate the sewer service area, and on PSCOG population projections to project wastewater flows, the proposed wastewater system improvements will not "cause" the growth projected by other agencies, but rather will assist its accommodation. Although neither Metro nor EPA is institutionally "responsible" for growth and its accompanying secondary impacts within the study area, the philosophy that EISs are full disclosure documents dictates that such secondary impacts be examined in this EIS, and that mitigation measures be identified for EPA, Metro, or other public agencies when appropriate. This is particularly important in the case of air quality, agricultural land, wetlands, floodplains, and cultural resources impacts, for which EPA has developed explicit policies to mitigate adverse secondary impacts. Those measures identified for Metro may be the basis for grant conditions.

Relation of Wastewater Alternatives to Growth and Secondary Impacts

Local Recognition of Relationship Between Sewerage Availability and Growth. The important relationship between sewerage availability and growth has been formally recognized by King County's Sewerage General Plan and General Development Guide (first draft) policies, and by Metro's Resultion 2933. (It should be noted that the General Development Guide [first draft] is currently being revised.) The King County Sewerage General Plan identifies local service areas (the only areas eligible to receive sewerage service), and establishes a local service area amendment process to assure consistency of sewering decisions with the county's growth policies. The county's General Development Guide (first draft) has development policies recommending that subdivisions with densities of three dwelling units per acre or more be served by sanitary sewers; these policies effectively limit development in areas without available centralized sewerage service to densities of less than three dwelling units per acre.

Metro, in its Resolution 2933, requires affected local agencies to certify that trunk or interceptor sewers and sewer hook-ups are consistent with applicable local land use plans before it will construct the sewer or allow connection to the Metro system. Through this resolution Metro is limited to constructing only those sewers which are consistent with local land use policies.

Growth and Secondary Impacts of a No-Project Alternative. Technically, the most accurate method for assessing the secondary impacts of a wastewater treatment expansion project is to compare the impacts of growth patterns, in the absence of the project, with those that would occur if the project is implemented. Unfortunately, it is not possible to follow this procedure in this EIS because PSCOG's regional growth projections assume major increases in sewered population, thereby assuming that necessary wastewater treatment capacity will be available in the future. No regional growth projection exists which assumes no further increases in sewered population within the study area, and the generation of such a projection is a very complex process beyond the scope of this EIS.

In the absence of a sewerage-constrained growth projection, this EIS assumes that since expanded wastewater treatment facilities will play some role in accommodating the population growth projected by PSCOG, it is appropriate to examine the environmental impacts of the PSCOG growth projections and consider these as the secondary impacts of Metro's Wastewater Management Plan. It is possible, however, to make some generalizations related to the growth impacts of a no-project alternative. Lack of expanded wastewater treatment capacity would be unlikely to affect the Puget Sound regional growth rate, which is largely determined by birth rates, death rates, and net in-migration (the latter strongly influenced by job opportunities and lifestyle preferences). However, lack of sufficient wastewater treatment capacity could have major effects on the distribution of new development, by (1) encouraging development within other portions of the Puget Sound region with adequate wastewater treatment capacity, and (2) encouraging lower density development within the study area more compatible with the use of on-site systems, which would require additional acres to be urbanized.

Growth and Secondary Impacts of the Recommended Program

Although this chapter assesses the secondary impacts of projected growth within the entire study area, Metro's recommended program calls for the expanded 72 MGD Renton plant to provide service to only the south part of the study area currently tributary to the Renton plant. Sewered areas currently tributary to the West Point treatment plant would continue to be served by that plant unless future planning decisions call for diversion of these flows to the Renton plant via the Redmond connection and North Creek/Hollywood connections, as envisioned in Alternative A-3. The analysis in this chapter nevertheless considers secondary impacts throughout the study area because a possible consequence of the recommended program would be the eventual treatment of flows from the north part of the study area at the Renton plant.

Assumptions for Secondary Impact Assessment

Several assumptions have been made in preparing the following analysis of growth-related secondary impacts.

- Availability of expanded treatment plant capacity within the study area will assist in accommodating additional population growth.

- Availability of expanded treatment plant capacity is only one of many factors (such as employment growth, market forces, lifestyle preferences, local land use policies, and infrastructure decisions) that together operate to influence growth patterns.

- The population growth and land use changes that will occur in the study area are those projected by PSCOG in its "policy" projection.

- The adverse secondary impacts of growth have been recognized by responsible agencies having jurisdiction within the study area; these agencies have developed plans, policies and regulations to mitigate such impacts, and the effectiveness of these measures depends on their implementation.

- Sewer service will be provided outside of the initial sewer service area as a result of incremental local service area changes after 6 to 10 years.

Because of this last assumption, the assessment of secondary impacts is not limited to the identified sewer service area, but also takes into account growth impacts outside the service area but within the Wastewater Management Plan study area. Although the nonsewer area will generally not be served within the next 6-10 years, amendments to the King County Sewerage General Plan and future Metro interceptor sewer decisions will eventually expand the service area for the Renton plant beyond the present boundary. Expansion beyond the current sewer service area can occur before all projected sewered population occurs within the current service area. This would have the effect of increasing the study area sewered population beyond that projected by PSCOG, thereby accelerating the rate at which capacity is used at the Renton plant.

Future EPA decisions related to the Renton sewerage system may involve incremental expansion of the current service area boundary. It is therefore important that the secondary impact analysis in the EIS examine the impacts of growth throughout the study area in a regional, comprehensive manner. With this approach, the EIS can serve as the basis for assessment of the cumulative impacts of future sewerage projects tributary to the Renton plant.

Contents of Chapter

The next section of this chapter describes and assesses the PSCOG population forecasts which underly the Metro Wastewater Management Plan. The remaining sections of the chapter describe impacts and mitigation measures within the following areas: air quality, surface water and biology, groundwater, land use, public services, and public finance.

Description and Assessment of PSCOG's Population Projection

Method

To project the geographic distribution of total population, employment and land use change within the planning area, PSCOG used a computer-assisted model called the Activity Allocation Model (AAM). This model seeks to answer the question, "What significant relationships can be found between the 1960 census data set and the 1970 census data set which can be used to account for the changes in households and employment which occurred over that 10-year interval?" It formulates the answer in a series of ten simultaneous equations which produce projected changes in the number of households and number of employees in each defined district. Land use changes are derived by applying density factors to projected numbers of households and employees. The AAM operates in 10-year forecast increments, and policy assumptions and model results are evaluated for each increment.

The model's ten equations require two types of inputs: data inputs and policy inputs. The data inputs describe the number and distribution of households in various income categories, the household density, the amount of employment in various economic sectors, the relative location of employment opportunities (expressed as highway travel times), land use for various economic activities and a "composite amenity index". The policy inputs include travel time to future housing and employment locations, water and sewer service availability, the relative location of households in other income categories and the amount of vacant land available.

PSCOG has derived two distributions of population, housing and land use for the study area. One is a trends allocation, which is characterized by the primary importance of market demand in determining patterns of land use. For that allocation, only the limitations on development inherent in the current regulatory context were imposed; they included zoning, subdivision regulation, land costs, availability of services, existing tax laws and the availability of funds to build new infrastructure such as highways, sewers and water supply systems. The other distribution is the policy allocation, which is characterized by restrictions on the conversion of land from rural to urban use. The policy allocation therefore provided that only low density uses would be allowed in unsewered areas, that decisions regarding sewer and water line extensions would be made by local governments rather than by sewer and water districts, and that sewer service areas would be expanded only by small amounts by 1990. In addition, it contained "a significant increase" in incentives for infill and compact development.

Projected Population

PSCOG projects that population in King and Snohomish Counties will increase from 1,575,000 in 1980 to 2,112,500 in the year 2000, an average annual growth rate of 1.5 percent. The projection for the Renton 201 study area, which includes portions of King, Snohomish and Pierce Counties, varies between the policy allocation and the trends allocation. In the policy allocation, area population would grow from the 1980 level of 537,087 residents to a total of 805,248 residents, an average annual increase of 2.0 percent. This growth would be concentrated in the western portions of the study area, with the largest shares of the total increase occurring in the North Lake Washington, Green River and East Lake Washington basins. In the trends allocation, the population of the study area would grow to a total of 858,450 residents, an average annual increase over 1980 of 2.4 percent. This growth would spread out more completely over the study area; the largest shares would locate in the Green River, North Lake Sammamish and North Lake Washington basins. The distribution of new population in the study area projected under the two allocations is compared in Table 7-1.

Critique

The AAM used by PSCOG to develop its population projections relies on trends observed between 1960 and 1970 to predict changes that will occur in the future. It distills the observed trends into a series of equations that describe changes in population and employment factors as well as land use and transportation conditions and policies.

This approach is subject to question on several grounds, some of which were noted in a PSCOG information item dated March 9, 1977. First, because it relies on data from 1960 and 1970, it cannot account for influences on urban form not present during that decade, such as gasoline and housing prices and interest rates, that are significantly higher relative to real income than they were during that period.

Second, because the model predicts on the basis of observed trends rather than the underlying reasons for those trends, it is susceptible to the statistical problem known as covariance; this problem occurs when variation in one condition appears to cause variation in a second, but in reality the variation in both results from the activity of a third factor. Finally, problems could result from the availability of local data and the consistency of data measurement, a factor of particular importance in land use information.

The accuracy of any forecast, regardless of the method or model used to develop it, may be expected to diminish as its distance into the future increases because there may be influences on development patterns that could not be foreseen or incorporated into the forecasting process. Examples of such influences are changes in technology, changes in family structures, changes in economic conditions and changes in government policies. These factors may affect both the

Table 7-1

PROJECTED POPULATION INCREASE BY DRAINAGE BASIN, RENTON STUDY AREA, 1980-2000

	Policy Allocation				Trends Allocation		
Basin	1980	2000	Increase	% of Study Area Increase	2000	Increase	% of Study Area Increase
North Lake Washington	99,611	167,702	68,091	25	153,650	54,039	17
North Lake Sammamish	47,140	81,312	34,172	13	101,972	54,832	17
East Lake Washington	121,142	180,694	59,552	22	151,258	30,116	9
South Lake Washington	63,601	77,158	13,557	5	105,217	41,616	13
South Lake Sammamish	38,024	51,863	13,839	5	59,340	21,316	7
Green River	133,075	193,877	60,802	23	230,053	96,978	30
White River	13,804	29,244	15,440	6	33,299	19,495	6
Mercer Island	20,690	23,398	2,708	1	23,661	2,971	1
TOTAL	537,087	805,248	268,161	100	858,450	321,363	100

Source: Puget Sound Council of Governments overall level and type of development within a geographic region and the distribution of that development among subareas of that region.

A more detailed analysis and discussion of the demographic forecasts prepared by PSCOG may be found in Appendix A of the EIS.

Comparison of PSCOG Forecast to Other Forecasts

EPA Grant Regulations Relating to Population Forecasts. In 1978, EPA established regulations for population forecasts to be used in facilities planning. The forecasts are to be based on state projections prepared for EPA by the Bureau of Economic Analysis (BEA) of the Department of Commerce in 1977. BEA is the federal agency responsible for most economic forecasting, and is known in particular for its OBERS (Office of Business Economics/Economic Research Service) series of forecasts, on which the projections prepared for EPA were, in part, based.

EPA has determined that its funding decisions will be based on BEA's state totals, which each state is required to disaggregate to water quality planning areas. There are two exceptions to the mandate to use the BEA projections: (1) in the event either a state, or a water quality planning area, had completed its own population forecast prior to June 26, 1978, that forecast can be used instead of the BEA-based projection if the state projection does not exceed by more than 5 percent the BEA state total, and the regional projection does not exceed by more than 10 percent the regional total determined by disaggregating the BEA state projection; or (2) the BEA projection may be appealed to EPA in Washington.

The Bureau of Economic Analysis (BEA) Projections. The BEA approach is "top down", based on analysis of the national economy and of each state's economy in relation to the nation as a whole. For all states, including Washington, BEA developed projections for 1980, 1985, 1990, and 2000. Because no adopted Washington state forecast predates June 1978, these BEA projections would normally serve as the basis of EPA funding decisions in the State of Washington.

Status of BEA Projections in the State of Washington. The State of Washington Office of Financial Management (OFM) had undertaken its own population forecasting at the time BEA's work for EPA was proceeding, and in 1979 the state published that forecast. Because the state's forecast deviated sharply from the BEA projection (exceeding the BEA figures by about 20 percent) a resolution of the difference was sought by EPA in order to make clear the basis on which the agency's funding decisions in the State of Washington would rest.

After reviewing a request by OFM for acceptance of the 1979 state forecast in lieu of the BEA projection, EPA headquarters instead authorized interim use of a forecast based on the BEA projection increased by 10 percent in the year 2000. Table 7-2 presents a comparison of the forecasts mentioned so far: the initial BEA projection, the adjusted BEA projection authorized for EPA use in funding decisions, and the OFM 1979 forecast rejected by EPA for funding purposes. A fourth forecast presented in the table represents OFM's most recent revised state forecast.

The four projections presented in Table 7-2 show a wide range in year 2000 population levels. Only a small amount of this difference is attributable to different 1980 bases; most of it arises from differences in rates of growth. The State of Washington forecast represents about 24 percent more people in the state in the year 2000 than the 4,858,000 level acceptable to EPA.

There has been considerable discussion between EPA and the state about the differences in their forecasts, and EPA has indicated procedures for challenges to the projections EPA has proposed to use for funding decisions. It is not known whether the State of Washington plans further challenges, nor is it yet known how the anticipated publication of new OBERS state projections or the actual 1980 census enumeration (when published) could affect the ultimate population figures applied in EPA's funding decisions.

Multiplicity of County and Regional Forecasts. Disagreement about the future population is not confined to state-level projections. There is also lack of agreement about regional forecasts. At the regional level, the disparity is of concern not only because it affects funding levels but also because it suggests contradictory guidance to the regional wastewater agency, Metro. That is, Metro is required to both use the allocations of state population projections to regions in its wastewater facilities planning according to state law, and to abide by regional planning criteria according to the charter of the agency and according to the Metro 208 plan. Where state and regional agencies disagree on the future growth of the region, Metro cannot follow both paths simultaneously. Table 7-3 compares the most recent allocations for the Puget Sound region and King County, including the DOE allocation of the EPA-approved state population projection. Also shown is the proposed revision to the PSCOG regional projection, which had not been adopted as of late 1980.

Table 7-2

WASHINGTON STATE POPULATION FORECASTS AND PROJECTIONS (000s)

	1980	1985	1990	2000
1. BEA 1977 Projection for EPA	3,738	3,908	4,076	4,417
2. BEA Adjusted Projection Approved for Interim EPA Use in Funding Decisions	3,926	4,159	4,392	4,858
3. OFM August 1979 Forecasts	4,036	4,490	4,836	5,345
4. OFM December 1979 Revised Forecasts	4,068	4,619	5,090	6,024

Sources:

1. U. S. Department of Commerce, Bureau of Economic Analysis: *Population, Personal Income and Earnings by State, Projections to 2000*, October 1977.
2. U. S. Environmental Protection Agency, Region X, Craig Partridge, pers. comm., April 2, 1980.
3. Washington, State of, Office of Financial Management: *Recommended Washington State Population Forecasts for Use in Municipal Wastewater Treatment Construction Grants Program*, September 1979.
4. Washington, State of, Office of Financial Management: *State and County Population Forecasts by Age and Sex: 1980-2000* (Special Report No. 30), January 1980.

Table 7-3. Comparison of Regional and King County Population Forecasts (000s)

Area	Projection by	1980	1990	2000
Puget Sound Region	PSCOG - 1977	2,137	2,570	2,974
	PSCOG - Proposed 1980 revision	2,188	2,632	3,073
	OFM (8-79)	2,190	2,655	2,935
	OFM (12-79)	2,210	2,798	3,326
	DOE Allocation of EPA Projection	-	-	2,679
King County	PSCOG	1,235	1,400 (Policy)	1,575
			1,429 (Trends)	N.T.
	PSCOG - Proposed 1980 revision	1,257	1,443	1,679
	OFM (8-79)	1,268	1,530	1,707
	OFM (12-79)	1,280	1,611	1,928
	DOE Allocation of EPA Projection	-	-	1,551

N.T.: Not tabulated.

Sources:

1. Puget Sound Council of Governments, Mayor Beth Bland: *Memorandum to King Subregional Council regarding Forecasts*, February 13, 1980.
2. Puget Sound Council of Governments, Tim Watterson: *Memorandum to PSCOG staff regarding regional population, employment, income forecast revision.*
3. Washington, State of, Office of Financial Management: *1979 Revision of County Population Forecast for Washington State: 1980-2000 (Table 1)*, August 1, 1979. December 1979 forecasts from PSCOG memo cited in (1) above.
4. Department of Ecology: *Letter to EPA Region X*, September 4, 1980.

As shown by Table 7-3, for King County, the DOE allocation is similar to the PSCOG projection, whereas for the Puget Sound region, the DOE allocation is significantly lower than the PSCOG projection. This does not appear to be a major problem, since most of Metro's study area is within King County, where the projections generally agree. It should be noted that the DOE allocation will apply only to grants issued after January 1981, and that the allocations will be revised after 1980 census data become available.

Secondary Air Quality Impacts

Background

Under Section 316 of the Clean Air Act Amendments of 1977, the EPA is authorized to withhold, condition, or restrict any grant for construction of sewage treatment facilities if the proposed project will accommodate a larger increase in air pollutant emissions than provided for under the local portion of the State Implementation Plan.

The Washington State Implementation Plan, which includes the air quality management plan (AQMP) for the central Puget Sound region, was conditionally approved by the EPA on June 5, 1980. Details of the Central Puget Sound AQMP, which is a plan for attaining federal standards for ozone, carbon monoxide, sulfur dioxide, and particulates, may be found in Appendix B of this EIS.

Assessment of Impacts

To determine whether Metro's Wastewater Management Plan will accommodate a larger increase in emissions than provided for in the local AQMP, the population projections underlying both plans are compared here. Although the AQMP region consists of four counties (King, Pierce, Snohomish, and Kitsap), only portions of the first three are within the wastewater plan study area; therefore, Kitsap County has been excluded from the comparison of population projections.

Emission forecasts for population-dependent source categories were developed for the AQMP by utilizing the September 1978 PSCOG population projection. In contrast, the Lake Washington/Green River Basins wastewater management plan is based on PSCOG's 1979 population projection. As indicated in Table 7-4, there is less than 1 percent difference between the September 1978 and May 1979 PSCOG population projections for the three counties. This difference is not considered significant,

Table 7-4. Comparison of September 1978 and May 1979 PSCOG Population Forecasts for the Three-County Puget Sound Air Quality Planning Region

County/PSCOG Forecast Year	Year 1980	Year 1990
Pierce		
September 1978	405,870	499,348
May 1979	414,998	516,092
Difference	9,128	16,744
Percent Difference	2.3	3.4
Snohomish		
September 1978	291,266	361,418
May 1979	291,266	375,076
Difference	0	13,658
Percent Difference	0	3.8
King		
September 1978	1,203,756	1,378,111
May 1979	1,207,756	1,367,440
Difference	4,000	10,671
Percent Difference	0.3	-0.8
Three-County Total		
September 1978	1,900,892	2,238,877
May 1979	1,914,020	2,258,608
Difference	13,128	19,731
Percent Difference	0.7	0.9

since emissions forecasts for population-dependent source categories are based upon emission factors which exhibit larger margins of error than 1 percent.

From the comparison in Table 7-4, it can be concluded that the proposed plan is consistent with the Central Puget Sound AQMP; a re-evaluation of consistency would be required if either the local portion of the State Implementation Plan or the facilities plan are amended to incorporate updated population forecasts. Since the population projections used in Metro's wastewater management plan are consistent with those used in the AQMP, the secondary air quality impacts of growth accommodated by the wastewater plan have been examined in the AQMP.

It should be noted that population growth is only one factor affecting ambient air quality. Some of the interrelationships between growth and air quality are explored in a recent PSCOG study (PSCOG, 1980).

Mitigation Measures for Air Quality Impacts

The AQMP air quality control measures act as mitigation measures for the wastewater plan's secondary air quality impacts; no additional mitigation measures are needed for this EIS. The AQMP control measures are intended to attain and maintain federal air quality standards in the central Puget Sound basin.

Secondary Surface Water and Biological Impacts

This section describes the generalized secondary impacts of study area population growth on surface water quality, aquatic ecosystems, and terrestrial ecosystems. Details regarding existing biological and water quality conditions within the study area may be found in Appendix C of the EIS.

Secondary Surface Water Quality Impacts

Background. The many lakes and streams in the study area generally have good chemical water quality, in terms of conventional toxic or oxygen-depleting pollutants. The main types of water quality problems in the study area are generally high coliform bacteria levels caused by malfunctioning septic tank systems, or by pet, livestock, or wild animal wastes; and erosion and sedimentation caused by land disturbance and impervious surfaces that accompany urbanization.

Water Quality Impacts of Urban Runoff. The land use changes that accompany population growth alter the runoff characteristics of land. The general effect is to increase the amount of immediate surface runoff for a given amount of rainfall. Higher runoff rates are caused by impervious surfaces (rooftops, driveways, streets) and other factors such as decreased raindrop interception by vegetation and lower moisture-retention capacity of disturbed soil.

Runoff coefficients (the ratio of runoff to rainfall) chosen by Metro for use in runoff modeling studies (Buffo, 1979) illustrate the great effect urbanization can have. The runoff coefficients for different land uses are as follows:

Industrial	.95
Commercial	.90
High Density (multifamily)	.60
Medi Density (multifamily)	.35
Low Density (single family)	.20
Open Space - Rural	.05
Agricultural	.01
Forest	.005

Urban runoff can cause adverse water quality impacts in streams and lakes. Study area streams are probably most affected by sedimentation caused by raindrop impact on disturbed soils, increased runoff rates, and streambank erosion. Study area lakes are probably most affected by nutrient enrichment, primarily phosphorus.

Metro has developed suspended solids, phosphorus, and lead loading rates for various land use types within the study area (Buffo, 1979); similar loading rates for other nonpoint source pollutants are not available. Table 7-5 presents some of these loading estimates and indicates the great increases in nonpoint source pollutants that occur with urban vs. nonurban uses, and with stable vs. unstable (recently disturbed) sites.

Table 7-5. Nonpoint Source Pollutant Loading Estimates for Land Use Types in Locations near Kent, Washington

	Site Characteristics	Total Phosphorus (lb/acre/yr)	Total Suspended Solids (lb/acre/yr)	Lead (lb/acre/yr)
Industrial	Stable	1.1	356.3	0.98
	Unstable	3.2	1,500.4	
Commercial	Stable	0.8	161.4	1.4
	Unstable	3.6	921.6	
High Density Multifamily	Stable	0.9	369.3	0.2
	Unstable	2.7	421.9	
Medium Density Multifamily	Stable	0.1	31.2	0.1
	Unstable	1.8	286.8	
Low Density Single family	Stable	0.08	8.2	0.2
	Unstable	0.5	93.8	
Open Space Rural	Stable	0.01	1.4	0.001
	Unstable	0.07	1.5	
Agricultural - Pasture	Stable	0.38	-	-
Agricultural - Farming	Stable	0.0002	-	-
Forest - Douglas-fir	Stable	0.00002	-	-

SOURCE: Buffo, 1979.

It should be noted that pollutant loading rates are only a rough indication of potential nonpoint source water quality impacts. Of greater importance are the actual effects of nonpoint source pollutants on specific receiving waters. Such an analysis can only be done by considering each water body individually.

Metro has used the phosphorus loadings in Table 7-5 to estimate the phosphorus loading to Lake Washington under future year 2000 conditions of increased urbanization (Figure 7-1). Because the population and land use projections used by Metro are similar to those used in this EIS, it can be assumed that the phosphorus loading increase shown in Figure 7-1 is similar to that which can be expected using the current PSCOG projections.

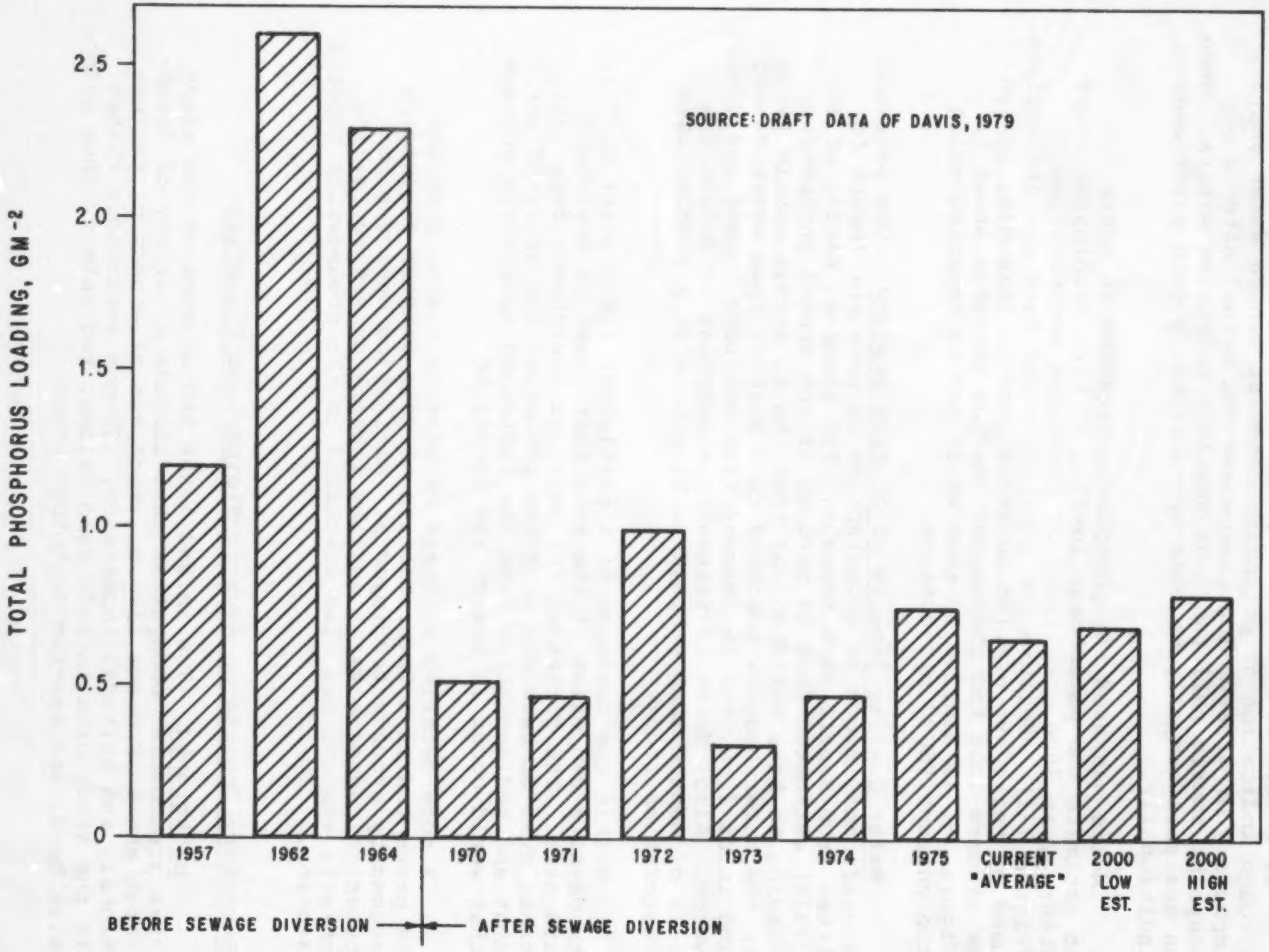
Water Quality Impacts of On-Site Systems. One possible significant impact of urbanization is nutrient impact to lakes from septic tank seepage. For example, Davis, et al. (1978) estimated that 14 percent of the annual phosphorus loading to Lake Meridian was from the 65 active septic tanks in the watershed, as compared to 3 percent from storm runoff and inlet flow, and 16 percent from nonstorm runoff and groundwater. Also, Metro is presently attempting to define the role of septic tank seepage in Pine Lake in a special lake restoration study.

Within the drainage of a particular lake, water quality trade-offs can exist at the time that sewering decisions are made. The potential for nutrient enrichment from septic tanks must be balanced with the potential for nutrient enrichment and sedimentation from the increased impervious acreage that would occur if sewers are installed.

A more detailed analysis of on-site system problems is presented in a later section of this chapter discussing secondary groundwater impacts. Mitigation measures for potential adverse water quality impacts caused by failing on-site systems are also discussed in the groundwater impacts section.

Secondary Impacts on Aquatic Biology and Fisheries

Background. The inland lakes and streams of the study area are complex ecosystems that include a variety of freshwater and anadromous fishes, which are of economic, recreational, and cultural importance. Common anadromous fishes in the study area include coho salmon, red salmon, chum salmon, steelhead, and sea-run cutthroat trout.



SOURCE: DRAFT DATA OF DAVIS, 1979

FIGURE 7-1. HISTORICAL, CURRENT & PROJECTED PHOSPHORUS LOADING TO LAKE WASHINGTON

Streams. The following discussions describe expected effects of increased runoff or nonpoint source pollution loadings on stream flora, invertebrates, and fish.

Flora. Increased algal and aquatic plant growths in streams due to higher nutrient loadings may occur (this can be counteracted by the scouring effects of higher storm peaks). The most likely areas for increased plant growth would be backwater areas and the lower, slow-flowing reaches of streams. The effects of increased plant growths in streams could be adverse if biomass reaches levels that actually physically choke the stream or cause dissolved oxygen depletion, or if growth in rooted plants along stream margins slows stream flows, causing increased sedimentation. Moderate increases in plant growth could actually enhance invertebrate and fish production.

Invertebrates. The data plotted on Figure 7-2 illustrate how urbanization is affecting stream invertebrate communities in the study area. This figure shows the average "percent EPT" for stream invertebrate samples gathered in a subdrainage basin as a function of the percentage of the subdrainage basin that is urbanized. The percent EPT is the percent of stream invertebrates in a sample that belongs to the insect orders emphemeroptera (mayflies), plecoptera (stoneflies), or trichoptera (caddisflies). These insect groups are generally regarded as good fish food. Furthermore, these insect groups are relatively intolerant of sediment or organic pollution, as opposed to some forms of oligochaete worms and fly larvae. Thus, the percent EPT is a "living index" of physical and chemical stream quality.

Figure 7-2 is a scientific indication that urbanization is having adverse impacts on stream habitat quality in the study area. Sedimentation is probably the main factor causing this general decline. The study area as a whole is currently 19 percent urbanized, which would result in an average EPT index of 51 percent, according to the regression line. With the study area 28 percent urbanized in the year 2000 (projected in the PSCOG policy projection), the average EPT index would be reduced to 45 percent, which is a significant reduction.

Fish. The hydrologic, water quality, invertebrate community, and other changes accompanying urbanization will adversely affect stream salmonid (salmon and trout) populations through a variety of interacting pathways. Figure 7-3 illustrates some of these pathways. Increased runoff and soil erosion from urbanization can induce flooding, streambank erosion, scouring, stream channelization (a human response), sedimentation, and adverse effects on stream invertebrates and fishes. Among fishes, salmonids are particularly sensitive to sedimentation and scouring because they bury their eggs in stream gravels.

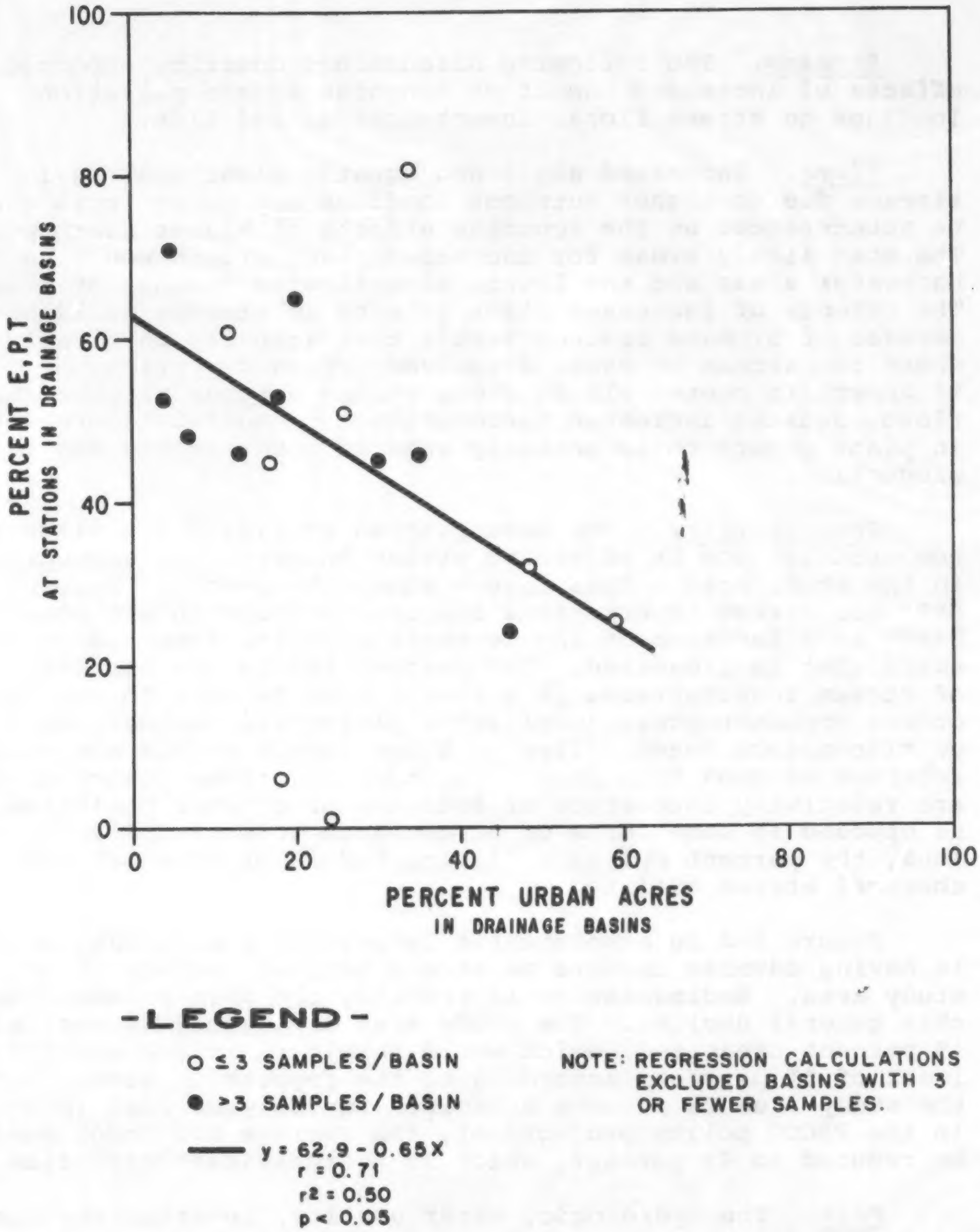


FIGURE 7-2. RELATIONSHIP BETWEEN URBANIZATION AND CLEAN-WATER STREAM INSECTS (PERCENT *Ephemeroptera*, *Plecoptera*, *Trichoptera*) IN RENTON STUDY AREA.

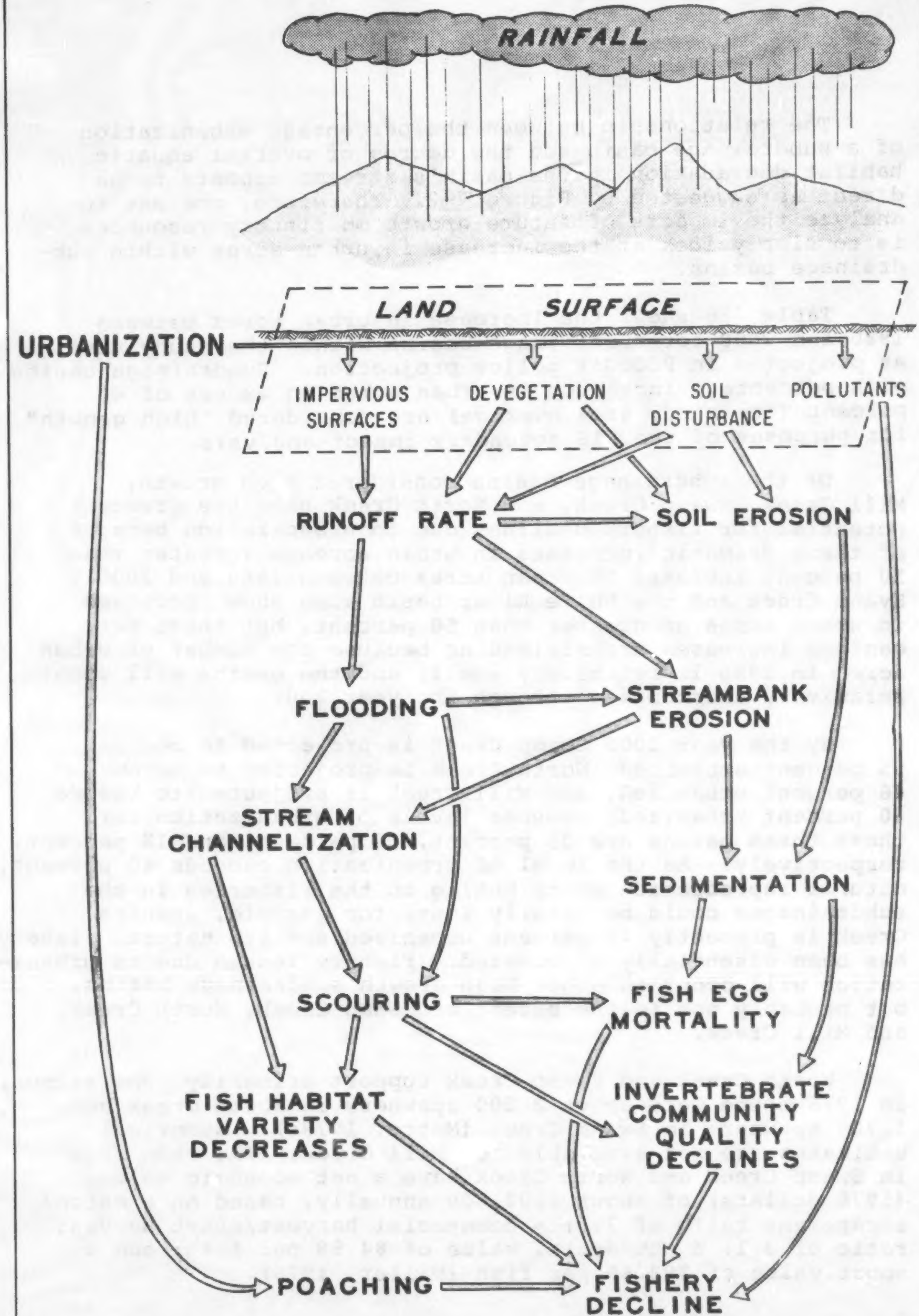


FIGURE 7-3. URBANIZATION IMPACTS ON SALMONID FISHERY RESOURCES

The relationship between the percentage urbanization of a subdrainage basin and the degree of overall aquatic habitat degradation in the basin's streams appears to be direct as suggested by Figure 7-2. Therefore, one way to analyze the impacts of future growth on fishery resources is to simply look at the increase in urban acres within subdrainage basins.

Table 7-6 shows the increase in urban acres between 1980 and 2000 for subdrainage basins within the study area, as projected in PSCOG's policy projection. Subdrainage basins with percentage increases in urban acres in excess of 40 percent (the study area average) are considered "high growth" for purposes of the EIS secondary impact analysis.

Of the subdrainage basins considered high growth, Mill Creek, Swamp Creek, and North Creek have the greatest potential for fishery declines due to urbanization because of their dramatic increases in urban acreage (greater than 50 percent increase in urban acres between 1980 and 2000). Evans Creek and the White River basin also show increases in urban acres of greater than 50 percent, but these percentage increases are misleading because the number of urban acres in 1980 is relatively small, and the basins will remain relatively unurbanized through the year 2000.

By the year 2000 Swamp Creek is projected to become 55 percent urbanized, North Creek is projected to become 46 percent urbanized, and Mill Creek is projected to become 40 percent urbanized; present levels of urbanization for these three basins are 35 percent, 30 percent, and 18 percent, respectively. As the level of urbanization exceeds 40 percent, natural reproduction contributing to the fisheries in the subdrainages could be totally lost; for example, Juanita Creek is presently 46 percent urbanized and its natural fishery has been essentially eliminated. Fishery losses due to urbanization will occur in other high growth subdrainage basins, but probably not to the extent of Swamp Creek, North Creek, and Mill Creek.

North Creek and Swamp Creek support primarily coho salmon; in 1976 there were about 2,200 spawners in North Creek and 1,700 spawners in Swamp Creek (Metro, 1978c). Numerical estimates are not available for Mill Creek. The coho runs in Swamp Creek and North Creek have a net economic value (1976 dollars) of about $102,000 annually, based on a catch/escapement ratio of 2.0; a commercial harvest/sport harvest ratio of 3.1; a commercial value of $4.88 per fish; and a sport value of $92.40 per fish (Miller, 1976).

Table 7-6. Increase in Urban Acres by Subdrainage Basin, 1980-2000

Major Basin Subbasin	Estimated Total Acres	Urban Acres 1980 (percent)	Urban Acres 2000 (percent)	Additional Acres Urbanized 1980-2000	Percent Increase in Urban Acres 1980-2000
North Lake Washington	149,645	14,086 (28)	21,590 (43)	7,504	53
Swamp Creek*	15,738	5,572 (35)	8,668 (55)	3,096	56
North Creek*	21,062	6,386 (30)	9,808 (46)	3,422	54
Little Bear Creek*	12,845	2,128 (17)	3,114 (24)	986	46
North Lake Sammamish	51,188	8,658 (17)	12,233 (24)	3,575	41
Sammamish River	11,738	3,534 (30)	4,744 (41)	1,210	34
Evans Creek*	31,533	4,111 (13)	6,160 (20)	2,049	50
Pine Lake	7,917	1,013 (13)	1,329 (17)	316	31
East Lake Washington	33,728	16,346 (48)	19,702 (58)	3,356	21
Juanita Creek	16,851	7,759 (46)	9,612 (51)	1,853	24
Kelsey Creek	4,973	2,922 (59)	3,398 (68)	476	16
Coal Creek	11,904	5,665 (48)	6,692 (56)	1,027	18
South Lake Washington	41,120	89,044 (22)	11,165 (27)	22,021	25
May Creek	10,669	2,744 (26)	3,553 (33)	809	29
Cedar River	30,451	6,200 (20)	7,612 (25)	1,412	23
South Lake Sammamish	51,104	5,896 (12)	7,324 (14)	1,428	24
Tibbetts Creek	9,165	3,145 (34)	3,478 (38)	330	11
East Lake Sammamish	4,736	724 (15)	968 (20)	244	34
Issaquah Creek*	37,203	2,009 (5)	2,878 (8)	869	43
Green River Basin	136,869	18,293 (13)	28,681 (21)	10,388	57
Mill Creek*	28,460	5,234 (18)	11,310 (40)	6,076	116
Green River	18,406	4,458 (24)	5,888 (32)	1,430	32
Soos Creek*	17,414	3,199 (18)	4,613 (27)	1,414	44
Lake Young	3,309	463 (14)	563 (17)	100	22
Jenkins Creek	12,160	1,524 (12)	1,867 (15)	343	23
Covington Creek	35,859	2,488 (7)	3,172 (9)	684	27
Newaukum Creek	21,261	927 (4)	1,268 (6)	341	37
White River Basin*	27,475	2,701 (10)	4,940 (18)	2,239	83
Mercer Island	4,109	2,560 (62)	2,878 (70)	318	12
TOTAL	395,238	77,484 (20)	108,513 (27)	31,029	40

*Denotes subdrainage basins with urban acre increase greater than 40 percent, considered "high growth" for purposes of secondary impact analysis.

Several additional high growth drainage basins which could be adversely affected by nonpoint sources were identified in King County's King County Streams: A Disappearing Resource. Those which are over 10 percent urbanized and which were predicted to experience at least a 50 percent increase in urban acreage in addition to those already measured were Lake Sammamish, Juanita Creek, Black River, Mercer/Kelsey Creek, and lower Puget Sound.

Lakes. Population growth accommodated by expansion of Metro's wastewater facilities may affect study area lakes due to sedimentation and nutrient enrichment. Possible general effects on lake flora and fishes are reviewed below.

Flora. Nutrient enrichment due to higher nutrient loadings may increase algal and aquatic plant standing crops. However, this may be offset in some locations by nutrient diversion due to sewering of septic tank areas; for example, nutrient concentrations in Lake Meridian decreased immediately following installation of sewers in 1973 (Davis, et al., 1978). Future nutrient loadings will depend on the degree of urbanization and sewering decisions. Excessive algal and plant growth would have adverse impacts on recreation (swimming, boating, waterskiing) and aesthetics.

Fish. The impacts of additional algal or aquatic plant growth on fish depend on the degree of such growth. Moderate algal or plant growth could increase lake fish productivity by providing more energy at the base of the food web. Also, aquatic plants provide small fish protection from predators. If aquatic plant or algal growth results in dissolved oxygen levels below approximately 6 mg/l in the deep portions of lakes then the value of the lake as fish habitat would decrease.

Mitigation Measures for Water Quality and Fisheries Impacts

The preceding analysis has attempted to identify the streams in which fisheries will be most affected. Inaccuracies undoubtedly exist due to the uncertainty associated with PSCOG's land use projections, and the imperfect nature of the correlation between urbanization, water quality impairment, and habitat degradation. The important point is that water quality impairment and anadromous fish losses are occurring due to urbanization and could continue to occur in the future.

Metro and other local agencies are conscious of this problem and have initiated steps to mitigate it. As Figure 7-3 shows, the key to mitigating fishery losses, as well as mitigating flooding, streambank erosion, and sedimentation problems caused by urbanization, lies in controlling runoff rates and soil erosion. Consequently, these problems have been addressed comprehensively in drainage planning studies, in particular the RIBCO drainage studies, Metro's 208 plan, and local drainage planning.

RIBCO Studies. The 1974 RIBCO studies (STR, 1974a; U. S. Army Corps of Engineers, 1974) identified present and future water quality and drainage problem areas in the Cedar and Green River basins, and proposed institutional and structural solutions. Alternative solution plans were prepared for each subdrainage basin. The RIBCO studies recommended that coordinated drainage management programs be worked out among the various jurisdictions in each subdrainage. Recommended RIBCO policies call for retention of the natural open drainage system, wetlands protection, and floodplain zoning, with local government being responsible for detailed facilities planning.

Metro 208 Plan. The RIBCO studies were followed by Metro's 208 areawide water quality planning. As the designated 208 agency for the Cedar-Green River basins, Metro is responsible for areawide water quality management planning, partially funded by EPA under the Clean Water Act. The Metro 208 plan's primary objective is the development of adequate surface drainage control programs. The plan reiterated RIBCO's emphasis on developing cooperative local government agreements for drainage control in each basin.

Progress in implementing the 208 plan, as of June 1980, has been summarized by Metro (1980i). Metro reports that roughly two-thirds of the assigned local responsibilities are either completed or in progress. Significant local actions have included: 1) completion of a Union Bay demonstration project by Seattle, King County and Metro; 2) adoption of a Surface Water Master Plan and a revised clearing grading ordinance by Bellevue; 3) approval by Bellevue voters of an advisory ballot issue representing a strong local commitment for purchase of wetlands and open space; 4) development of a draft Drainage Management Plan by Seattle; and 5) development of options for a coordinated surface water management program by King County staff. Metro has also made substantial progress in developing an agressive water quality planning and management approach.

Areas of least accomplishment by local jurisdictions reported by Metro are 1) development and implementation of local water quality enforcement programs; 2) development of water quality expertise in local staff as part of the ordinance process; 3) funding for surface water programs; and 4) implementation of best management practices for nonpoint source pollution control.

Of course, even full implementation of 208 plan recommendations would not completely eliminate nonpoint source impacts. Also, not all jurisdictions are moving forward to implementation as quickly as was hoped. For example, although creation of a surface runoff utility for King County was identified in the 208 plan as an important method to control runoff from urbanization, such a utility has yet to be created, due to budgetary and other constraints.

Local Plans and Policies. The Juanita Creek Basin Plan (King County, 1977), the Green River Basin Program, and the City of Bellevue comprehensive drainage plan are examples of more local drainage basin planning for solution of drainage problems. However, in many of the subdrainage basins projected for large increases in urban acres, local drainage planning has not been undertaken.

King County has proposd many policies relating to drainage in its General Development Guide (first draft). Among these are:

- Controls on development adjacent to water bodies
- Maintenance of natural watercourses
- Preservation of wetlands

Shoreline Management Act. Another possible means of protecting water quality and fisheries from effects of urbanization is the Shoreline Management Act of 1971. Implementation depends greatly on local formulation and implementation of shoreline management plans.

Summary. In summary, several institutional mechanisms are currently in place to address fisheries and other drainage-related impacts caused by urbanization. Although these programs are not comprehensive and their success cannot be assumed, EPA is providing funding for 208 continuing planning. Additional mitigation measures other than continued funding for 208 planning do not appear appropriate at this time as part of this EIS.

Secondary Impacts on Terrestrial Ecosystems

The principal secondary impact of growth on terrestrial ecosystems will be conversion of coniferous and deciduous forests, and agricultural and rangelands, to urban uses. Secondary impacts on agricultural and forestlands, wetlands, and floodplains are discussed later in this chapter under secondary land use impacts.

It can generally be stated that urban development has adverse effects on natural terrestrial ecosystems, primarily through destruction or extensive modification of habitat. The Department of Game has indicated that farmlands, wetlands, and riparian vegetation have special biological resource values which are threatened by conversion of these areas to urban uses.

Given the regional nature of the growth projections examined in this EIS, it is not reasonable to further assess the impacts of urbanization on terrestrial wildlife and ecosystems, largely because these differ with different urban land uses. In general, industrial and commercial land uses have substantially less value to wildlife than low density residential uses. The degree of impact on wildlife depends on mitigation measures implemented as part of site planning, particularly retention of tracts or corridors of open space. No new mitigation measures for secondary impacts on terrestrial ecosystems are proposed as part of this EIS.

Secondary Groundwater Impacts

Background

A substantial proportion of the population growth projected for the Lake Washington/Green River Basins will rely on on-site systems as a long-term waste disposal option. For the year 2000, PSCOG assumes the unsewered population within the study area to be 124,078.

Treatment Capability of Local Soils. Most of the soils in the Renton study area have moderate to severe limitations for use as septic tank leach fields. In particular, the Alderwood and Beausite soil series which cover most of the nonsewer area have severe limitations due to shallow depth and an extremely slow permeability in the subsoil. Everett soil series have moderate limitations due to the extremely high permeability of the entire soil profile. Additional data on soil limitation ratings for septic tank leach fields are presented in Appendix D.

Major Contaminants of Concern. The contaminants of concern with respect to domestic on-site disposal systems consist of those elements that can degrade the quality of surface or groundwater resources, thereby creating direct and indirect health hazards to human beings relying on such sources of supply. These contaminants consist of nitrogen compounds and pathogens. If effluent from on-site systems enters surface water bodies, other elements such as phosphorus may also create water quality problems.

Assessment of Impacts

Analysis of Septic Tank Failure Data. Individual septic tanks/soil absorption systems operate at a high failure rate in the Renton study area. The King County Health Department estimates that between 5 and 10 percent of such systems may be experiencing failure at any one time. Failures result from the often unfavorable site conditions, inadequate design of the system, poor quality construction, and lack of regular maintenance. Two social causes may also contribute significantly to these problems. First, the traditional view toward on-site systems is that they are temporary solutions for the waste disposal problem. Thus, until recently, there was little motivation to spend more than the minimum amount of resources in design and construction of on-site units. Second, because septic tanks are low visibility, they are often ignored by the homeowner, who may not even be aware of septic tank and drain field locations.

A small survey of home loan certification forms in King County found that 36 out of 92 systems surveyed (40 percent) were either failing or showed signs of a potential failure (Metro, 1980g). Common problems found included:

- Construction of driveways, garages, patios, decks, or other structures over the drain field;
- Diversion of surface water runoff to the drain field area;
- Compaction of the drain field by parking cars over the field or pasturing of animals on the field;
- Irregular or nonexistent septage pumping and provision of other maintenance.

In addition, when no reserve drain field area is available, repair of a failing system becomes extremely difficult. New regulations of the Seattle/King County Health Department require a reserve drain field area of either 50 or 100 percent, depending upon the system's location.

When on-site systems fail and effluent surfaces, potential risks to public health are created. In addition, the septic tank effluent can cause nutrient enrichment problems if it reaches streams and lakes. A less visible, but equally serious impact, can result if septic tank effluent reaches groundwater. Risks to groundwater from on-site systems in the study area are reviewed below.

Risks to Groundwater. "Groundwater failure" occurs when inadequately treated effluent reaches groundwater bodies. Groundwater failure may result from drain field installation on excessively permeable material offering inadequate biochemical renovation capability, or where effluent is discharged directly into a shallow water table, receiving inadequate treatment due to the saturated conditions. Phosphorus, bacteria, and viruses are known to migrate over long distances under conditions of saturated flow.

Groundwater failure of an individual septic tank system can affect the quality of water pumped from a shallow downgradient well, depending on the distance between the site and the well, and on the local aquifer's hydraulic conditions. On a broader scale, groundwater failure can seriously pollute a regional aquifer if many systems are installed on excessively sandy or gravelly material; this type of hazard results from system design and site selection. Because it is extremely difficult to locate, document or evaluate groundwater failure, only recently have regulatory agencies recognized such failure as a pollution hazard.

Although accurate estimates of pollutant loadings to groundwater aquifers cannot be developed at this time due to the lack of data on distribution pattern and density of on-site disposal systems in nonsewered portions of the study area, rough estimates are possible. It is generally agreed that there are 65,000 septic tanks currently in use in the study area. If it is assumed that average household size is 2.7 people per dwelling and total annual wastewater flow and nitrogen emissions in the study area can be calculated as follows:

annual effluent discharge = 13,000 acre-feet
estimated nitrogen concentration = 40 mg/l
annual nitrogen load = 700 tons

These areawide loading data may exaggerate the importance of groundwater quality impacts, because on-site systems may be widely scattered and not all the effluent discharged from these systems reaches the groundwater body. More importantly, the loading from the on-site systems is diluted by natural recharge and by mixing with large volumes of high quality groundwater.

On a local basis, however, emissions from even a few on-site disposal systems could be a major concern for protecting the quality of existing water supplies. Thousands of shallow domestic wells are in use in the Renton study area. Unfortunately, data are generally not available on the chemical characteristics of water pumped from these wells.

Data that are available generally do not indicate contamination of groundwater from on-site systems, with the possible exception of nitrate, which tends to be of greater concentration in shallow, unconfined aquifers than in deeper, more confined aquifers; observed nitrate levels in shallow wells are, however, well below drinking water standards.

Generally, under optimal conditions, shallow wells drilled in Vashon till would have relatively little risk of groundwater failure. If drain fields are installed at high densities, or if inadequate distance is allowed between drain fields and water supply wells, groundwater contamination would result even in the Vashon till. For wells constructed in recessional outwash and other highly permeable deposits, the risk of groundwater contamination from on-site disposal systems increases significantly, even though no evidence of surface failure of septic tank drain fields may be detected.

Mitigation Measures for On-Site Systems

Metro-Proposed Measures. In its Wastewater Management Plan, Metro has proposed the following recommendations for on-site systems management in the nonsewer area:

- Establish a comprehensive program for design, construction, and maintenance of on-site and community systems.
    - Identify an areawide management agency and implement a program demonstrating long-term commitment to management of nonsewer areas.
    - Establish on-site management zones in nonsewer areas where system performance or soil condition is poor.
    - Establish a routine performance monitoring system.
    - Further strengthen existing rules and regulations to emphasize proper design and construction.
- Provide adequate staffing and funding for on-site wastewater management programs, and provide adequate enforcement of rules and regulations.
- Encourage experimentation with alternative technologies.
- Establish a public education program emphasizing the long-term nature of on-site systems and proper design, construction, and maintenance.

Determine Groundwater Carrying Capacity. The emphasis in the Metro recommendations is on solving the problems created by poorly functioning or failing on-site disposal systems, in the context of traditionally accepted definition of septic tank failure. Attention should also be directed to the groundwater impacts of such systems, even where apparent system failure, such as surfacing of wastewater, may not have been observed. In the context of this objective, it is recommended that the following additional measures be undertaken to: 1) determine groundwater quality impacts of on-site disposal systems, and 2) evaluate the carrying capacity of various hydrologic or drainage units:

- Selected shallow domestic water supply wells in areas of the Alderwood soil series on Vashon till deposit should be monitored. These wells should be selected in subareas with low, medium, and high densities of on-site disposal systems. (Details of a proposed monitoring program are given in Appendix D of the EIS.)
- A similar groundwater monitoring program should be carried out in areas of the Alderwood soil series on alluvial deposits and Everett soil series on recessional outwash deposits for zones of low, medium, and high septic tank densities.
- If the results of the shallow domestic well monitoring programs indicate the occurrence of groundwater contamination, the density of the monitoring network should be increased and wells of medium and high depth should also be included in the sampling program.
- Results of the monitoring program should be used to identify areas of potential groundwater contamination in the study area.
- Data on groundwater carrying capacity of hydrologic units or drainage basins should be developed prior to establishing allowable development density levels in nonsewer areas. The carrying capacity can be determined on the basis of geologic, hydrologic, and aquifer hydraulic conditions.

EPA Role. EPA encourages the implementation of the previously-listed mitigation measures for on-site system management. Without such improved management, groundwater or surface water quality problems may result from continued use of these systems in the nonsewer portion of the study area.

The main responsibility for implementing improvements to on-site system management rests with local land use and health agencies. Metro has also taken on some water quality management responsibilities in the nonsewer areas. As part of its decision, EPA is recommending that appropriate local agencies take every available action to ensure that Facilities Plan recommendations for management of on-site systems in the nonsewer area are implemented. Of specific concern is the need to develop a management system for subsurface system maintenance and solids disposal.

Secondary Land Use Impacts

Study area population growth will be accompanied by changes in land use patterns within the study area. This section assesses three land use impacts of special importance to EPA: the consistency of Metro's proposed service area with local plans and policies, the conversion of prime farmland to urban uses, and the impacts of development on environmentally sensitive areas.

Consistency of the Metro Service Area with Local Land Use Policies

EPA requires that wastewater facilities plans be consistent with applicable land use plans and policies. The major aspect of Metro's facilities planning with land use implications, aside from the population and land use projections, is the service area map.

Metro's service area map (Figure 4-1) delineates three categories of land within the study area: sewer service area, nonsewer area (long-term land use certain), and the sewer service uncertain (long-term land use uncertain). The sewer service area consists of those lands which known local land use policies suggest should be sewered; King County's Sewerage General Plan, which is not a 20-year plan but is subject to periodic amendment, provided the major basis for mapping of service areas within King County. The nonsewer area (long-term land use certain), consists of those lands which local policies suggest should not be sewered over the 20-year planning period; these lands consist of small pockets of agricultural land in unincorporated King County and Redmond. The sewer service uncertain area consists of lands for which there is no present land use policy guidance; these lands are treated as nonsewer lands in the Metro Wastewater Management Plan, and would be included within the sewer service area once local governments designate these lands for sewer service. Therefore, the 20-year service area for the Renton sewerage system is likely to be larger than that shown on Figure 4-1, since it is likely that additional lands will be designated for sewer service by local governments within the next 20 years.

Metro's intent is to show as a designated sewer service area only those areas which local policies dictate should be sewered. The service area map appearing in Metro's preliminary plan was assessed for potential inconsistencies with local policies by the consulting firm Kahn/Mortimer Associates as part of the EIS effort. As a result of that assessment (which appears in full in Appendix A of the EIS) revisions were made to produce the service area map appearing in the Wastewater Management Plan. It appears that the revised service area map appearing in the Wastewater Management Plan is now consistent with known land use plans and policies of local jurisdictions.

Prime Farmland Conversion

Background. An important issue in this EIS is the effect of growth projected for the study area on prime farmlands. This background section summarizes the following topics: definitions of agricultural lands, rationale for protection of agricultural lands, agricultural land resources within King County, the economics of agriculture in King County, and existing King County policies for agricultural land protection. Further background information on agriculture in King County may be found in Appendix A of the EIS.

Definition of Agricultural Lands. The terms prime farmland, cropland, and important farmland are important to distinguish for purposes of this analysis. The following definitions will be used:

Prime farmland: Land suitable for farming or silviculture with "soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods" (Lee, 1978). Prime farmlands are the "most efficient, energy conserving, environmentally stable lands available for meeting food needs" (CEQ, 1978).

Cropland: Land in cropland use. Not all cropland is prime farmland.

Important farmland: Important farmland is that farmland being mapped by the SCS under its current (LIM-3) mapping program. It consists of the following categories: prime farmland, unique farmland (additional farmland used for the production of specific high value crops), additional farmland of statewide importance (to be determined by state agencies), and additional farmland of local importance (where appropriate, to be determined by local agencies).

Rationale for Protection of Agricultural Lands. Between 1967 and 1975, about one million acres of prime farmland in the United States were converted to nonfarm use (Diderikson, 1977). This amounts to a loss of more than 3 square miles of farmland per day. The conversion of prime farmland to urban uses is essentially an irreversible change. National policies to slow the conversion of prime farmland have been developed for several reasons:

- It is increasingly important to preserve those lands best able to produce crops because the rate of farm productivity growth has been decreasing and export demands are increasing.

- Farmland preservation provides open space, aesthetic, and environmental benefits.

- In some areas, consumers benefit from lower food prices when commodities are produced locally.

Due to these factors, EPA in 1978 established an agency-wide policy to assure that its actions, regulations, and programs reinforce the retention of environmentally-significant agricultural land (EPA, 1978a).

Agricultural Land Resources Within King County. Agriculture played an important role in the history of King County, in that early settlers were attracted to the county's agricultural potential and accessibility to markets. Urbanization of the county since 1950, and development of irrigated agriculture in eastern Washington, have reduced the importance of King County agriculture to the local, state, and national economies. Nevertheless, preservation of remaining prime farmland in King County is important for the economic and environmental reasons listed previously.

The SCS has recently completed its inventory of important agricultural lands in King County. These lands are mapped in Figure 7-4. The prime farmlands shown on this map consist of Class II and Class III soils. The additional farmland of statewide importance shown on this map consists of certain

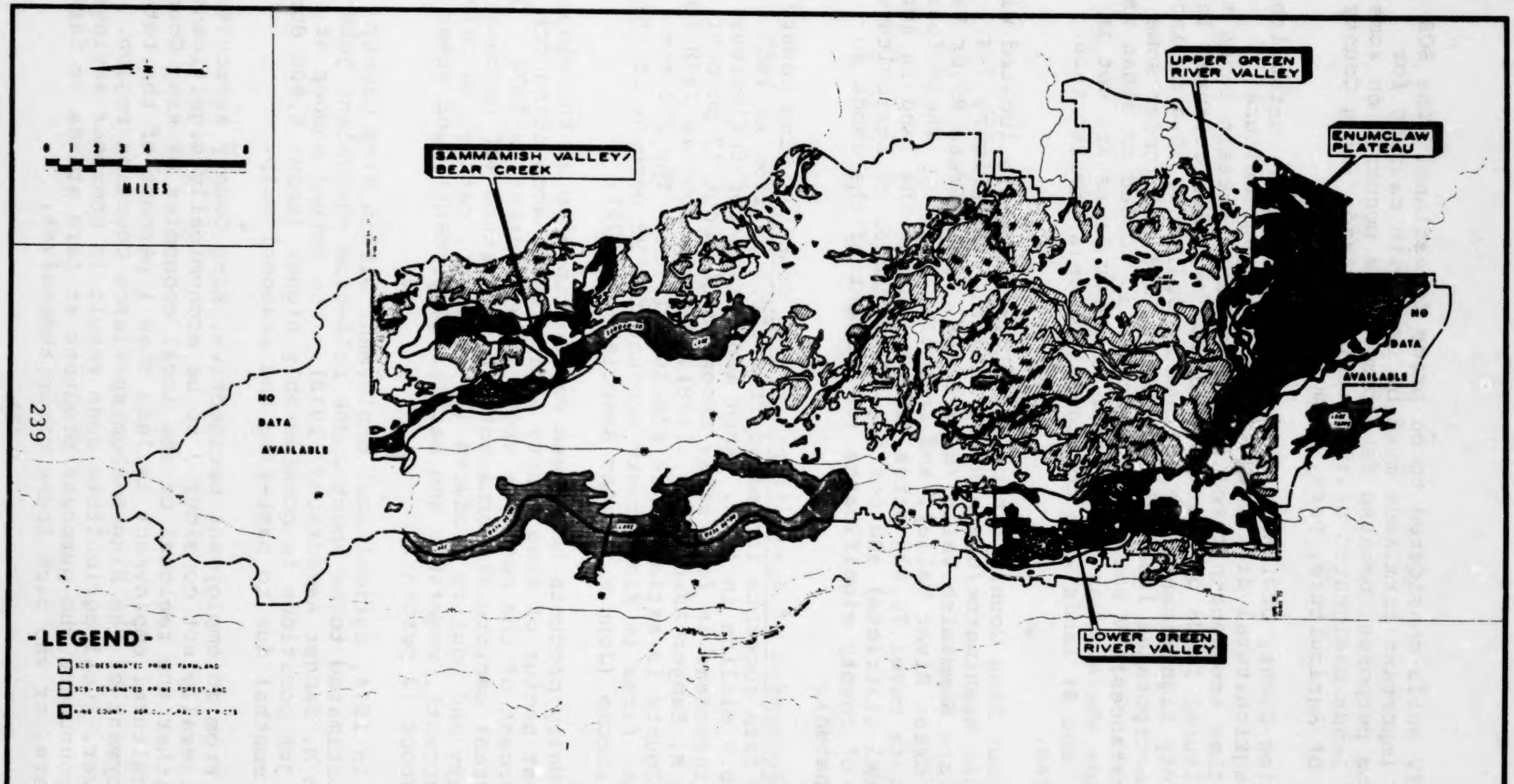


FIGURE 7-4. MAP OF SCS IMPORTANT FARMLANDS & OF KING COUNTY AGRICULTURAL DISTRICTS

Class IV soils considered to be prime forestland. The SCS map of important farmlands must be used with caution for planning purposes, because development has occurred on some of the lands designated as important farmlands (King County Office of Agriculture, pers. comm.).

King County Ordinance 3064, adopted in 1977, establishes eight agricultural districts (areas where agricultural activities are concentrated) and designates certain lands to be agricultural lands of county significance. Agricultural lands of county significance are defined by Ordinance 3064 to include: 1) unincorporated lands with Class II, III and (under some circumstances) IV soils, 2) lands not in wooded or urban uses, 3) lands where urban-level water or sewer lines are not in place, and 4) lands with contiguous parcels greater than 20 acres.

Four King County agricultural districts are located within the Lake Washington/Green River Basins. (See Figure 7-4.) These are Sammamish Valley/Bear Creek, Lower Green River Valley, Upper Green River Valley, and Enumclaw Plateau. These four districts cover 70,635 acres (65 percent of the land in agricultural districts) and contain 22,475 acres of agricultural lands of county significance (69 percent of the lands so designated).

Economics of Agriculture in King County. King County gross farm receipts increased from $20.5 million in 1959 to $40.5 million in 1974. When accounting for inflation, real increases in farm sales amounted to about 17 percent (John M. Sanger Associates, 1978). Farm income in 1978 for King County is estimated at $50-55 million. The 270 commercial farms in King County account for 92 percent of this farm income (John M. Sanger Associates, 1978).

Dairy products have been and continue to be the single largest sector of King County agriculture, accounting for 46 percent of the county's gross farm receipts in 1974. Other important sectors are ornamental horticulture (20 percent), poultry and poultry products (16 percent), cattle and calves (9 percent), vegetable and berries (6 percent), and other livestock (3 percent).

In 1974, agricultural employment within King County was estimated to be about 2,300 full-time equivalent jobs (John M. Sanger Associates, 1978). The actual number of farm job positions is considerably higher (about 5,600 during peak months) due to part-time and seasonal help.

From an employment perspective, King County agriculture is generally not considered to be economically significant to either the regional or the local economies of King County; agricultural employment is less than 1 percent of the total employment of the King-Snohomish-Pierce Counties region. However, local agriculture does result in consumer savings for consumers who purchase products at farm stands or farmers markets, or who pick these crops themselves.

Existing Policies for Agricultural Land Preservation in King County. King County has sought to preserve its agricultural land through a series of increasingly stronger policies and programs. These include policies in the King County Comprehensive Plan and communities plans, agricultural policies adopted in 1972 and 1974 (Ordinances 1096 and 1839), policies establishing agricultural districts and agricultural lands of county significance adopted in 1977, and policies limiting the sewering of significant agricultural lands found in the county's Sewerage General Plan (under revision as of early summer 1980). The latter policies have been adopted by Metro as well.

The main agricultural land preservation program currently in effect in King County is the purchase of development rights (PDR) program (Ordinance 4341). Under this program, a $50 million bond issue has been approved to acquire the voluntarily-offered development rights for priority farmlands. The PDR program, as well as the policies listed above, are reviewed further in the following discussion of mitigation measures for prime farmland conversion.

Assessment of Impacts. To assess the impacts of the growth projected for the study area on prime farmland conversion, a prime farmland conversion forecast was prepared.

Methods. Although the SCS mapped "important farmlands" (Figure 7-4) consist of both prime farmland and prime forestland, the EIS forecast of agricultural land conversion considers prime farmland only; it should be noted, however, that conversion of forestland to urban uses in western Washington is also an issue of economic and environmental concern. Also, the EIS forecast does not consider agricultural land conversion within the Enumclaw Plateau, since little urban growth is projected for this region.

The forecasting method employed assumes that within each of the remaining three agricultural districts within the study area (Sammamish Valley, Lower Green River Valley, Upper Green River Valley), prime farmland will be converted to urban uses at the same rate that suitable vacant land will be converted to urban uses; the vacant land conversion rates were in turn calculated based on PSCOG land use projections for AAM districts. Low conversion and high conversion scenarios were developed to establish a forecast range. The low conversion scenario uses the PSCOG policy land use projection, and assumes that agricultural lands of county significance will be protected. The high conversion scenario uses the PSCOG trends land use projection, and also assumes that county significant lands will be converted at the same rate as noncounty significant prime farmlands.

Results and Discussion. Table 7-7 presents forecasts of conversion of prime farmland between 1980 and 2000. The total prime farmland converted ranges between 3,950 acres (low scenario) and 5,213 acres (high scenario) over the 20-year period, representing a loss of 21 percent to 27 percent of the remaining prime farmland in the three districts. In the Sammamish Valley district, forecast conversions range from 698 acres to 1,464 acres; in the Lower Green River Valley district, from 3,252 acres to 3,600 acres; and in the Upper Green River Valley district, from 0 acres to 149 acres.

These findings must be qualified by the limitations of the forecasting methods employed. These include the assumptions that prime farmland will be converted at the same rate as suitable vacant land; the exclusion of hobby farms and vacant land held for speculation from the conversion forecast; and the lack of an up-to-date statistical inventory of prime farmlands.

Several factors will influence whether the low conversion scenario or the high conversion scenario is more likely to occur. These include the county's PDR program, the King County Sewerage General Plan process, urbanization trends, and existing zoning constraints.

Of these factors, the success of the PDR program is perhaps the most critical. As shown in Table 7-7, lands eligible for Priority 1 of the PDR program include all the prime farmland in the Upper Green River Valley, about 36 percent of the prime farmland in the Sammamish Valley, and only 10 percent of the prime farmland in the Lower Green River Valley. Therefore, if the development rights of 100 percent of the Priority 1 lands were to be purchased by King County in all three districts, prime farmland in the Upper Green River Valley district would be completely protected, whereas most prime farmlands in the Sammamish Valley and the Lower Green River Valley districts would not be protected.

Prime farmland conversion will have environmental and economic impacts which will depend largely on the size and productivity of the prime farmland parcels converted. Under either scenario, much of the acreage converted is prime farmland that is not of county significance and not included in Priority 1 of the PDR program. Although some of the noncounty significant and non-Priority 1 prime farmland is productive land within municipal boundaries, much of it is of limited productivity because it is in small parcel sizes, or not being actively farmed. Conversion of these noncounty significant and non-Priority 1 prime farmlands, nevertheless, represents the irreversible loss of a nonrenewable resource.

Table 7-7. Forecast of Prime Farmland Conversion*

Item	Agricultural Districts: Sammamish Valley	Agricultural Districts: Lower Green River Valley	Agricultural Districts: Upper Green River Valley	Study Area Total
Total acres	11,535	18,840	2,965	33,340
Prime acres	6,100	12,000	865	18,965
Agricultural land of county significance (acres)	1,735	1,510	865	4,110
Land eligible for priority 1 of PDR program (acres)	2,193	1,518	2,180	5,891
Vacant land conversion rate, 1980-2000 (policy)	16%	31%	6%	-
Vacant land conversion rate, 1980-2000 (trend)	24%	30%	17%	-
Prime farmland conversion, 1980-2000 (low forecast)				
- acres	698	3,252	0	3,950
- % of total prime farmland	11	27	0	21
Prime farmland conversion, 1980-2000 (high forecast)				
- acres	1,464	3,600	149	5,213
- % of total prime farmland	24	30	17	27

*Excludes Enumclaw Plateau.

Mitigation Measures for Prime Farmland Conversion.

Overview of Types of Mitigation Measures. Measures to mitigate the loss of agricultural lands to urban uses have been comprehensively reviewed in a recent EPA (1979b) EIS for wastewater facilities improvements in Modesto, California, located in the highly-productive San Joaquin Valley. Table 6-8 lists and evaluates the mitigation measures developed for that EIS.

Mitigation Measures for Metro Wastewater Management Plan. Of the general types of mitigation measures shown in Table 7-8 several are already in place in King County. For purposes of this EIS, the most important of these include the PDR program, King County's Sewerage General Plan, and Metro Resolution 3380 adopting the Sewerage General Plan. The effectiveness of these measures in mitigating the conversion of prime farmland is assessed below, and additional mitigation measures are then identified.

PDR Program. The PDR program has established three priority levels for acquisition of development rights. The first priority consists of 6,000 acres of lands most threatened by urban development in the Sammamish River Valley, the Lower Green River Valley near Kent, and the Upper Green River Valley, and 1,700 acres of farmland producing food for human consumption. The second priority consists of farmlands in the lower Snoqualmie Valley and Enumclaw Plateau, mostly dairy farms. The third priority consists of all other farmlands located within the county's agricultural districts.

Although it is not possible to predict exactly how much acreage that will be protected by the PDR program, the PDR program cannot offer complete protection for prime farmlands threatened by development because: 1) some landowners will refuse to participate in the program, and 2) the initially authorized $50 million is inadequate to purchase development rights for the third priority lands which constitute most of the prime farmland within the study area. As of late 1980, the initial $50 million in bonds had not been sold due to litigation. Though the possibility exists that more funds will be authorized, the PDR program can be considered only a partial mitigation measure for the loss of prime farmland within the study area, since it is unlikely that development rights for the third priority lands will be purchased.

King County Sewerage General Plan. As initially adopted, the King County Sewerage General Plan excluded designated agricultural lands of county significance as defined in Ordinance 3064 from local service areas, thereby prohibiting the sewering of these lands. A proposed amendment to the county's Sewerage General Plan (which has been adopted by Metro - see below), establishes the Priority 1 lands in the

Table 7-8.

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PRIME AGRICULTURAL LAND MITIGATION MATRIX

MEASURE PROPOSED	IMPLEMENTATION			TYPE OF MEASURE[1]		ORIENTATION		APPROACH		WHEN IMPLEMENTABLE[2]		LIKELY EFFECTIVENESS		
	LOCAL	STATE	FEDERAL	REGULATION	INCENTIVE	URBAN	AGRICULTURAL	DIRECT	INDIRECT	SHORT RUN	LONG RUN	STRONG	SLIGHT	UNKNOWN
A *Affect the amount of urban development*														
1 Limit the amount of land zoned for urban development	●			●		●		●		●		●		
2 Limit number of building permits issued	●			●		●		●		●				●
3 Limit industrial growth generators	●			●		●			●	●				●
B *Affect the density of development*														
1 Low minimum lot sizes in urban areas	●				●	●		●		●				●
2 High minimum lot sizes in rural areas	●			●			●	●		●		●		
3 Maximum lot sizes in urban areas	●			●		●		●		●		●		
4 Minimum neighborhood densities in urban areas	●			●		●		●		●		●		
5 Infill development in urban areas	●			●	●	●		●		●		●		
6 Cluster development in urban areas	●				●	●		●		●				●
7 Cluster development in rural areas	●			●			●	●		●			●	
C *Affect the location of urban development: control urban locations*														
1 Growth on or toward non-prime lands	●			●		●		●		●				●
2 Prohibition of subdivision on unincorporated lands	●			●		●		●		●		●		
3 Eligibility for housing programs		●	●	●	●	●			●		●			●
4 Eligibility for community development/redevelopment aid		●	●	●	●	●			●		●			●
5 New towns or satellite towns		●	●		●	●			●		●			●
6 Urban Strategy		●		●	●	●			●	●				●
Affect the location of urban development: maintain agricultural locations														
7 General plans	●			●			●	●		●				●
8 Federal (and/or state) review of general plan elements		●	●	●			●	●		●				●
9 Agricultural reserves		●		●	●		●	●		●				●
10 State regulation of agricultural land		●		●			●	●			●			●
11 Federal designation of exclusive agricultural districts			●	●			●	●			●			●
12 Condemnation or transfer of development rights	●	●		●	●		●	●			●	●[3]		●[3]
13 Compensable regulation		●		●			●	●			●	●		
14 Outright purchase of prime agricultural land		●		●			●	●			●	●		
15 Purchase of remainder interest		●	●	●			●		●		●			●
D *Limit the availability of urban infrastructure*														
1 Establish an urban service area for short-term growth	●			●		●		●		●		●		
2 Establish an urban expansion area for long-term growth	●			●		●		●		●		●		
3 EPA clean water grants		●	●	●		●			●	●				●
4 Restrict state and federal highway aid		●	●		●	●			●		●			●
5 Federal Regional Council coordination			●	●		●	●	●	●		●			●
E *Promote agricultural uses*														
1 Bring new agricultural lands into production		●		●	●		●	●			●	●		
2 Put purchased agricultural land to agricultural use		●		●	●		●	●			●	●		
3 Growth of cooperatives		●	●		●		●		●		●		●	
4 New merchandising methods		●	●		●		●		●		●			●
5 Intermediate technology for agricultural production		●	●		●		●		●		●			●
6 National (and/or state) prime agricultural land policy		●	●	●	●		●	●		●				●
7 Assure adequacy of future water supplies (conservation, reclamation, new projects)		●	●		●		●		●		●			●
F *Use tax policy to protect or encourage agricultural activity*														
1 Differential assessments for property tax purposes		●			●		●		●	●			●	
2 Unfair taxation of agricultural lands		●			●		●		●	●				●
3 Apply value capture techniques to land benefiting from public investment	●	●			●		●		●		●			●
4 Finance agriculture with non-agriculturally derived capital			●		●		●		●		●			●
5 Alter tax rules for industrial investment		●	●		●		●		●		●			●
6 Restructure formula for distributing sales tax revenue	●	●			●	●			●		●			●
G *Needed studies*														
1 Cost/benefit analysis of national prime agricultural land preservation			●							●				
2 Comparative inter-city analysis of prime agricultural land retention			●							●				
H *Performance standards for local growth*														
1 Threshold conditions	●	●	●	●		●		●		●		●		
2 Conversion coefficients	●	●	●	●		●		●		●		●		

[1] The implementation of some measures could be accomplished via either regulation or incentive.

[2] Assumes feasibility. Assignment to a column reflects judgment of time needed to establish operation/administration. "Short run" includes state and federal measures already in effect.

[3] Condemnation strong; transfer unknown.

Source: Gruen Gruen + Associates

SOURCE: EPA, 1979b.

PDR program as the "designated" lands to which sewer service will not be provided. Once this amendment is adopted, its main effect will be to make it more difficult to convert Priority 1 lands to urban uses, regardless of whether the development rights to these lands have been purchased. As previously discussed, the Priority 1 lands include all the prime farmland in the Upper Green River Valley district, 36 percent of the prime farmland in the Sammamish Valley district, and only 16 percent of the prime farmland in the Lower Green River Valley district. Because the Sewerage General Plan affords no protection to non-Priority 1 prime farmlands, it can be considered only a partial mitigation measure for prime farmland conversion.

Metro Resolution 3380. Metro's adoption of King County's Sewerage General Plan (Resolution 3380) prohibits Metro's sewering of unincorporated "designated agricultural lands", defined as Priority 1 lands under the PDR program. Because Resolution 3380 affords no protection to non-Priority 1 farmlands (like the Sewerage General Plan), or to Priority 1 lands within the city limits of Kent and Redmond, it can be considered only a partial mitigation measure for prime farmland conversion.

Additional Mitigation Measures. Within the existing institutional framework in the study area, several additional mitigation measures exist which could more completely mitigate the loss of prime farmland.

- Metro could establish a procedure to ensure that local land use agencies evaluate, with public input, the impacts to agricultural lands resulting from extension or connection to the Renton system of any new interceptor. Such an evaluation could consider alternatives and mitigation measures to avoid adverse impacts.
- King County could modify its Sewerage General Plan. The proposed amendment to the Sewerage General Plan could be strengthened by broadening the definition of designated farmland to include some or all prime farmland within King County agricultural districts that is not designated Priority 1 in the PDR program.
- The Cities of Kent and Redmond could adopt policies similar to King County to protect Priority 1 farmland located within municipal boundaries. Metro could then modify Resolution 3380 to reflect these policies.

Impacts on Sensitive Areas

Background. An important issue in this EIS is the effect of study area projected growth on environmentally sensitive areas. Environmentally sensitive areas, as defined by King County, consist of soil-related sensitive areas, floodplains, and wetlands. EPA policy requires that an assessment of floodplains and wetlands impacts be made and that adverse impacts be avoided or minimized if no practical alternative to the action exists. At the local level, King County has recognized the importance of environmentally sensitive areas by mapping those areas considered sensitive to development and by strengthening its policies for protection of these lands.

Assessment of Impacts. In this analysis, the locations of high growth subdrainage basins and sensitive areas are mapped. Impacts of projected urbanization on soil-related sensitive areas, wetlands, and floodplains are then discussed.

Identification of High Growth Subdrainage Basins. Eight high growth subdrainage basins within the study area were identified earlier in the secondary impacts analysis (see Table 7-6); these subdrainage basins are projected to show increases in urban acres greater than 40 percent (the study area average) between 1980 and 2000. Figure 7-5 shows the location of the high growth subdrainage basins.

The generalized locations of environmentally sensitive areas are shown in Figure 7-6. The original mapping of sensitive areas was done by King County (King County Department of Planning and Community Development, Planning Division, 1980); the composite map of sensitive areas was prepared by Metro (1979a). Comparison of Figures 7-5 and 7-6 can indicate which subdrainage basins have the greatest potential for secondary adverse impacts on sensitive areas. These subdrainage basins are identified in the following sections.

Soil-Related Sensitive Areas.

Characteristics and Potential Impacts of Urbanization. Areas identified on Figure 7-6 as soil-related sensitive areas include: Class III slide and slippage (landslides) areas, Class III seismic areas, erosion areas and coal mine areas.

Landslide hazards are commonly associated with the hillsides of many of the major valleys. These areas are characterized by steeply sloping unconsolidated glacial deposits that are very susceptible to gravity sliding.

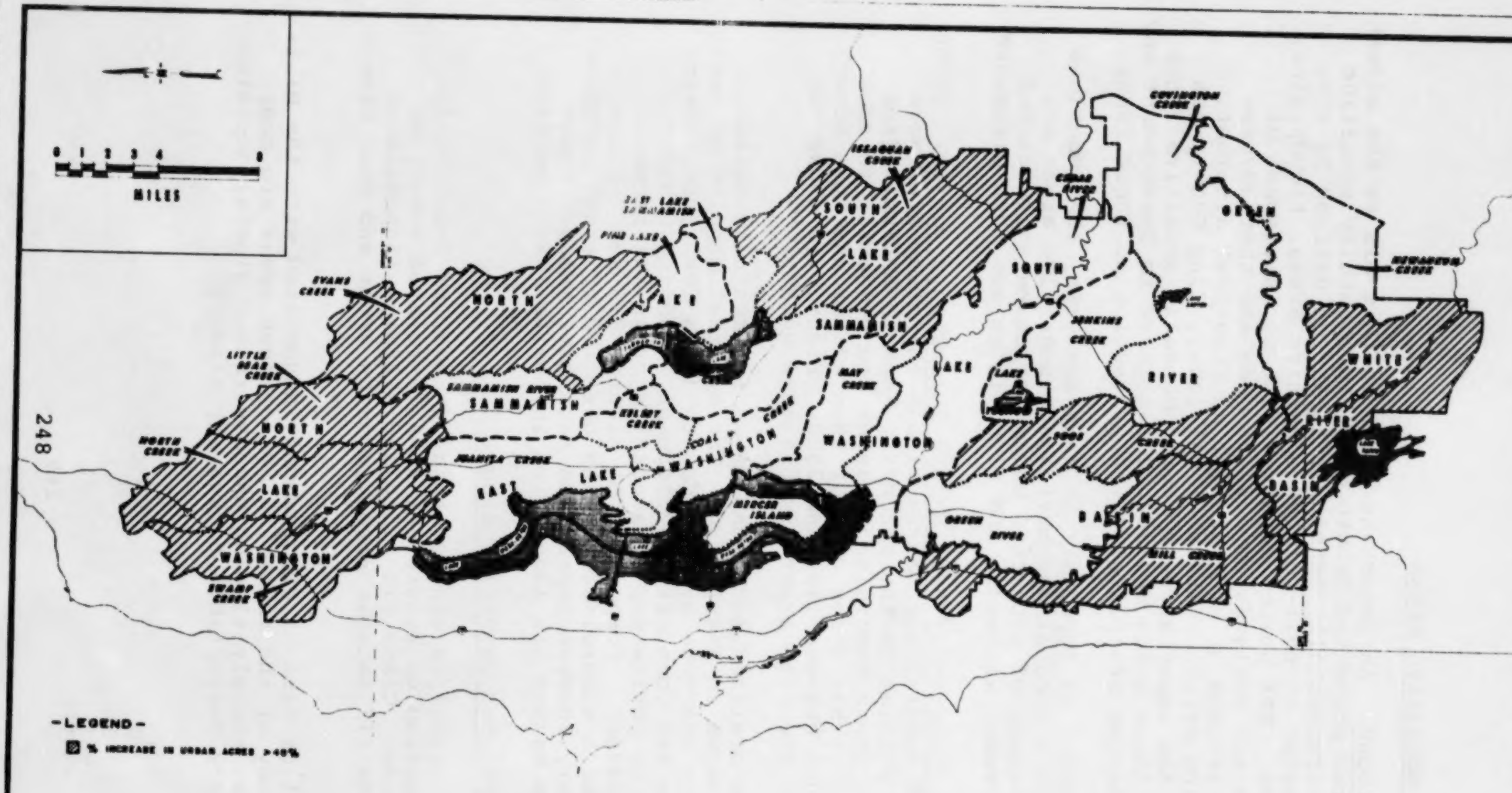
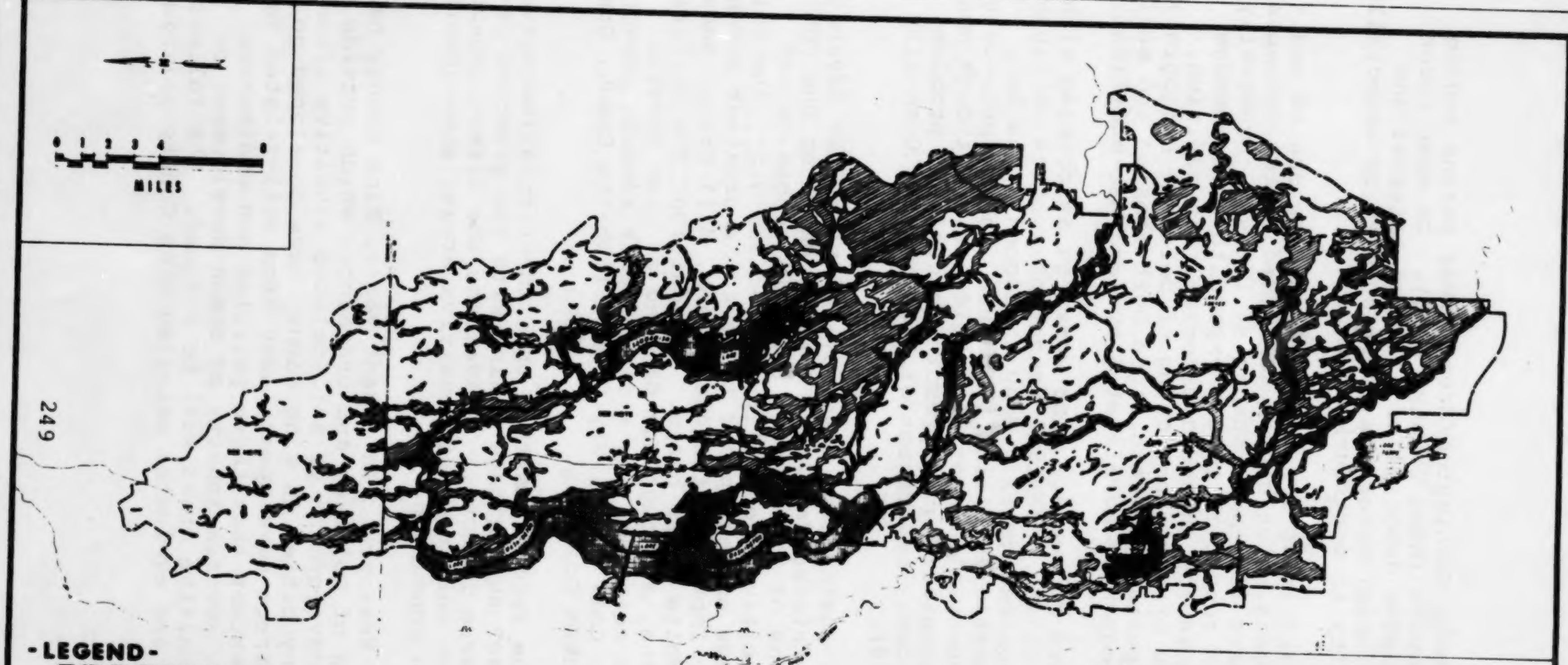


FIGURE 7-5. LOCATION OF HIGH GROWTH SUBDRAINAGE BASINS



-LEGEND-

▨ SOIL RELATED SENSITIVE AREAS (EROSION, SLIDE-SLIPPAGE, SEISMIC & COAL MINE AREAS)

■ WATER RELATED SENSITIVE AREAS

NOTE: KING COUNTY - EROSION, SEISMIC, LANDSLIDE (SLIDE-SLIPPAGE), FLOODING, WETLANDS & COAL MINE AREAS REGULATED BY SECTION 2 OF ORDINANCE 3821.

SNOHOMISH COUNTY - SOIL RELATED SENSITIVE AREAS (EROSION & SLIDE-SLIPPAGE) NOT REGULATED BY AN ORDINANCE, BUT PHYSICAL CRITERIA SAME AS KING COUNTY.

MODIFIED FROM METRO, 1979a

SOURCE: KING COUNTY DEPARTMENT OF PLANNING & COMMUNITY DEVELOPMENT, DIVISION OF PLANNING, "SENSITIVE AREAS MAP FOLIO" 1978, PUGET SOUND COUNCIL OF GOVERNMENTS, "LAND USE SUITABILITY ANALYSIS", 1975

FIGURE 7-6. COMPOSITE MAP OF SENSITIVE AREAS WITHIN STUDY AREA

The entire Lake Washington/Green River Basins region is seismically active (King County, 1980). In most river basins, the extensive deposits of alluvial material and unconsolidated glacial materials contribute to an especially high susceptibility to earthquake damage.

Erosion hazard areas are a concern mainly due to sedimentation, a process which occurs as eroded matter accumulates in receiving waters (streams, channels, lakes). Eventually, sedimentation can result in costly expenditures to dredge or otherwise remove the unwanted material. In addition, the threat to the proper functioning of delicate ecological systems is an important concern since both erosion and sedimentation are frequently accelerated by land use modification.

The abandoned subsurface mine workings associated with coal activates present potential danger of surface collapse and leakage of noxious gases. Many abandoned mines have been filled or partially filled by natural caving processes, which poses a potential danger of subsidence. Although coal mine areas are generally quite remote, occasional problems do arise (King County Department of Planning and Community Development, 1978).

Subdrainage Basins with Greatest Potential for Adverse Impacts on Soil-Related Sensitive Areas. Based on the comparative locations of high growth subdrainage basins and soil-related sensitive areas (Figures 7-5 and 7-6), the following subdrainage basins appear to have the greatest potential for adverse impacts: Issaquah Creek, Mill Creek, Soos Creek, and the White River basin. In addition, the following subdrainage basins, although not defined as high growth, also have a high potential for a significant adverse impact: Sammamish River, Coal Creek, May Creek, Tibbetts Creek, Green River, and Newaukum Creek.

It should be recognized that this identification serves only to "red flag" subdrainage basins with the greatest potential for adverse impacts. To evaluate the direct impact of development on soil-related sensitive areas, site-specific analyses must be conducted.

Mitigation Measures. In recent years, King County has adopted a series of policies and ordinances which provide guidelines for development of soil-related sensitive areas. In addition, many cities in King County have developed policy guidelines to direct development away from soil-related sensitive areas. To the extent that these policies and ordinances are implemented, adverse impacts of urban development on soil-related sensitive areas will be reduced. The following section reviews and evaluates existing King County policies.

Historically, policy concerning soil-related sensitive areas in King County has been included within open space policy. The open space element of the county comprehensive plan, together with subsequent amendments (Ordinance 1096 and Ordinance 1683), provides the existing basis for policy protection of soil-related sensitive areas. In recent years, the need for new and more specific policies has been recognized. King County's proposed General Development Guide (first draft) contains policies which, if adopted, would replace the existing policies relating to soil-related sensitive areas. These policies discourage development on slopes greater than 40 percent, and in landslide and coal mine hazard areas, and recommend reduced development intensity as slopes increase.

Implementation of policies relating to soil-related sensitive areas has been provided for with the adoption of King County Ordinance 4365 in July 1979. This ordinance defines and incorporates maps of soil-related sensitive areas, and establishes a review process on a case-by-case basis for development proposals in these areas. Before the ordinance can become effective, however, administrative guidelines to implement its provisions must be developed. These include uniform standards for development approvals, provisions to expedite the case-by-case review process, and incentives for dedications of lands for open space.

Wetlands.

Characteristics and Potential Impacts of Urbanization. In general, wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities inhabiting the area. The wetlands shown on Figure 7-6 include marshes, bogs and swamps. Classification of wetlands by subtype is often difficult due to gradational physical, chemical, and biological characteristics. In the larger marshes, shallow water is usually retained throughout the drier season. In contrast to bogs, marsh substrate is generally mud or muck with minor areas of peat. Swamps are similar to marshes except they are characterized by trees and larger shrub vegetation.

Wetlands are significant with respect to the wildlife they support and their role in maintaining water quality. Wetlands support a variety of wildlife, including small mammals, waterfowl, and other birds. Wetlands can also act as natural water purifiers, filtering out sediments and stripping nutrients, and thus helping mitigate the effects of upstream urbanization on downstream areas.

The main impact of urbanization on wetlands is the outright loss of the wetlands through conversion to urban uses. This may happen by filling, diking, draining, or otherwise removing the water from the land. When this happens, the wildlife, water quality, and aesthetic benefits of the wetlands are lost.

Subdrainage Basins with the Greatest Potential for Adverse Impacts on Wetlands. Based on the existence of a relatively large amount of wetlands, the following subdrainage basins appear to have the greatest potential for adverse impacts on wetlands: Evans Creek (a high-growth subdrainage basin), Coal Creek, and Covington Creek. These are general red flag areas, based on a very general level of analysis. Impacts of individual projects on wetlands should be evaluated on a case-by-case basis.

Mitigation Measures. The King County Sewerage General Plan prohibits sewering of designated King County wetlands. Metro adopted the provisions of the plan for existing unincorporated areas in its Resolution 3380. Policies on sewering of development on wetlands in incorporated areas of King County, and in Snohomish and Pierce Counties, are more fragmented and varied. Study area cities could adopt stronger policies to prohibit or discourage sewering of wetlands within existing municipal boundaries.

King County's proposed General Development Guide (first draft) contains proposed policies for additional protection of wetlands in the county. These policies encourage retention of wetlands in their natural state and discourage development adjacent to wetlands where wetlands would be adversely affected.

Floodplains.

Characteristics and Potential Impacts of Urbanization. The floodplain designations on Figure 7-6 are 100-year floodplains. These areas are lands expected to be covered by floodwaters at least once over a 100-year period. Partial flooding may occur more frequently. Excessive storm runoff and snowmelt are generally the sources of floodwaters.

Floodplains are significant areas with respect to their value as occasional watercourses and their value as wildlife and fishery habitat features. Natural floodplains in an overbank flow situation carry floodwaters at greatly reduced velocities, as compared to a diked or modified river channel designed to carry floodwaters within the confines of the channel. Thus, natural floodplains minimize erosion and detain the flow somewhat to lessen flooding in downstream areas. Floodplains also contain riparian habitat areas which support a great variety of animal life and provide shade and sustenance to stream fish.

The impacts of urbanization on floodplains occur through urban development on the floodplain area, and also through urban development of the floodplain's watershed. Development of the floodplain area can eliminate riparian vegetation and its benefits to wildlife and the stream community.

Streams are often channelized and diked to protect investments on floodplains, thus further destroying riparian vegetation. Sometimes streams overcome these structural control measures, causing economic loss and physical danger to people occupying the floodplain.

Development of a floodplain's watershed increases the areal extent of a flood of a given frequency (e.g., 10-year flood, 100-year flood). This is caused by higher runoff water due to impervious surfaces, and less infiltration of water into the ground. Thus, the 100-year floodplain area actually grows larger as urbanization of a watershed progresses.

Subdrainage Basins with the Greatest Potential for Adverse Floodplain Impacts. Based on the existence of relatively extensive floodplains, the following subdrainage basins appear to have the greatest potential for adverse floodplain impacts: Evans Creek, Coal Creek, Cedar River, Issaquah Creek, Mill Creek and White River basin. Four of these subdrainages are high growth, whereas two (Coal Creek and Cedar River) are not. These are general red flag areas identified by a very general level of analysis. Impacts of individual developments on floodplains should be analyzed on a case-by-case basis.

Mitigation Measures. The King County Sewerage General Plan prohibits sewering of designated floodplain areas in King County. Metro adopted the provisions of the plan for existing unincorporated areas in its Resolution 3380.

Implementation of floodplain protection programs in incorporated areas of King County, and in Snohomish and Pierce Counties, is more fragmented and varies with local government policies. Some floodplain areas (adjacent to water bodies larger than 20 acres in size or streams with mean annual flow greater than 20 cubic feet per second) may be partially protected from development by local shoreline management plans prepared pursuant to the State Shoreline Management Act of 1971. Study area cities could adopt stronger policies prohibiting or discouraging the sewering of floodplains within existing municipal boundaries.

King County's proposed General Development Guide (first draft) contains proposed policies for additional protection of floodplains in the county. These policies discourage development within the 100-year floodplain and prohibit development within the floodway.

The federal Flood Insurance Program requires participating communities to participate in mandatory floodplain management and flood protection measures, and to apply common sense and good engineering practice in reviewing and approving building permit applications.

Summary of Mitigation Measures for Sensitive Areas. A number of laws, plans, and policies currently exist for the protection of sensitive areas within the study area. In addition to those already mentioned, an important mitigation measure is the SEPA's requirement for preparation of EISs when individual development projects could have a significant effect on the environment. To the extent that the existing laws, plans, and policies are implemented, impacts on sensitive areas will be mitigated.

Metro could also establish a procedure to ensure that sensitive area impacts are evaluated by local land use agencies prior to any interceptor extension or connection to the Renton system. Such analysis could incorporate public input, and consider alternatives and mitigation measures for adverse impacts.

Public Service Systems

Most local governments within the Lake Washington/Green River Basins have policies encouraging the coordination of growth and the provision of public services. This section of the EIS discusses the effects of growth projected for the study area on public service provision.

Appendix A to this EIS describes in detail the existing management system and plans and policies regarding service provision, wastewater management, water supply, drainage, solid waste management, recreation, social services, transportation, and electricity and gas. This section of the EIS, for each of the services, summarizes the existing management system, identifies known existing capacity problems and describes the potential impacts of projected growth. Since comprehensive data on local system capacities are generally not available for all public service systems, emphasis is placed here on regional, macrolevel public service impacts. Mitigation measures for adverse impacts of growth on public services, consisting of local comprehensive and special-purpose plans and policies, are discussed at the end of this section.

Wastewater Management

Existing Management System. Within the study area, sewerage service is provided by local cities, water districts, and sewer districts, and by Metro, acting as a sewerage "wholesaler". Metro component agencies and existing Metro wastewater facilities within the study area are described in Chapter 1 of this EIS.

Existing Capacity Problems. As part of the identification of near-term actions for its facilities plan, Metro facilities with capacity problems were identified. In addition to these capacity problems, scattered local collection systems managed by cities and water or sewer districts are also experiencing capacity problems, or will experience such problems in the near future. In general, little information is available on local collection system capacity within the study area.

Impacts of Growth. PSCOG projects the sewered population within the study area will double over the next 20 years, from 340,890 in 1980 to 681,170 in the year 2000. In addition to the facilities planned in Metro's Draft Wastewater Management Plan, additional non-Metro facilities (in particular, collection sewers) will also be required to serve this growth. Some appreciation for the additional local collector sewers needed to serve projected growth may be gained by examining PSCOG's projections of sewered urban land within the study area. PSCOG's policy projection, shown in Table 7-9, predicts that sewered urban land will increase by 39,349 acres between 1980 and 2000. This amounts to 61.5 square miles of land, one-tenth of the entire study area, that must be provided with local collector sewers by Metro's component agencies over the next 20 years.

Numerous local sewer system projects will therefore be required to serve projected growth. Many of the needed local sewer projects have been identified in the comprehensive sewer plans which must be prepared by every local sewer agency within King County. If sewer system projects are not implemented in a timely fashion, growth could continue to create local sewerage system capacity problems.

The unsewered population growth within the study area will also place service demands on local agencies, particularly if increased on-site system management activities are implemented. Overall, PSCOG projects the study area's unsewered population to decrease from 196,198 in 1980 to 124,078 in the year 2000. However, this net decrease is attributable to much of the currently unsewered population becoming sewered over the next 20 years, and does not show that new population in outlying areas will continue to rely on on-site systems.

Water Supply

Existing Management System. Almost all of the study area is supplied with water by the City of Seattle Water Department, either directly or indirectly through approximately 36 retail water purveyors (cities and water districts). Seattle-supplied surface water from the Cedar River and Tolt River is the main source of water for most of the study area residents, with some outlying communities supplied by local wells.

Table 7-9. PSCOG Projections of Sewered Urban Acres by Subdrainage Basin, 1980-2000

Major Basin/Subbasin	1980	1990	2000	Increase 1980-2000	Percent Increase 1980-2000
North Lake Washington	7,264	13,206	19,416	12,152	167.3
Swamp Creek	2,799	5,809	8,347	5,548	198.2
North Creek	3,668	6,177	9,348	5,680	154.9
Little Bear Creek	797	1,220	1,721	924	115.9
North Lake Sammamish	3,953	6,266	8,171	4,218	106.7
Sammamish River	2,710	3,818	4,561	1,851	68.3
Evans Creek	931	1,497	2,420	1,489	160.0
Pine Lake	312	951	1,190	878	281.4
East Lake Washington	13,565	17,608	19,407	5,842	43.1
Juanita Creek	6,173	8,455	9,513	3,340	54.1
Kelsey Creek	2,656	3,031	3,382	726	27.3
Coal Creek	4,736	6,122	6,512	1,776	37.5
South Lake Washington	4,368	6,877	7,652	3,284	75.2
May Creek	947	1,540	2,047	1,100	116.2
Cedar River	3,421	5,337	5,605	2,184	63.8
South Lake Sammamish	3,499	4,029	4,305	806	23.0
Tibbetts Creek	2,665	2,955	2,990	325	12.2
East Lake Sammamish	138	201	260	122	88.4
Issaquah Creek	696	873	1,055	359	51.6
Green River Basin	10,142	15,159	20,800	10,658	105.1
Mill Creek	4,903	7,241	9,889	4,986	101.7
Green River	2,905	4,122	5,306	2,401	82.7
Soos Creek	1,551	2,558	3,822	2,271	146.4
Lake Young	44	77	111	67	152.2
Jenkins Creek	415	661	872	451	110.1
Covington Creek	288	419	669	381	132.3
Newaukum Creek	36	81	131	95	263.9
White River Basin	643	1,480	2,965	2,322	361.1
Mercer Island	2,534	2,761	2,601*	67	2.6
Study Area Total	45,968	67,386	85,317	39,349	85.6

*Decrease represents probable error in PSCOG projection.

SOURCE: PSCOG.

Existing Capacity Problems. Water supply capacity problems are of two types: regional and local. Regional water supply issues have been most recently addressed by the Comprehensive Regional Water Plan (Complan) prepared by the water department of Seattle (1980). The Complan projects that Seattle service area water demand will increase from a current demand of 155 MGD to 253 MGD in the year 2025. Since the existing system's capacity is 210 MGD (excluding groundwater), the Complan concludes that an additional supply of 50 MGD is needed by the year 1995. The Complan tentatively recommends that the North Fork Tolt River, with a firm yield of 70 MGD, be developed to provide the additional supply; development of the North Fork Snoqualmie River could become the preferred water source if its costs were equivalent to the North Fork Tolt River and if it were feasible.

Locally, scattered water supply problems related to insufficient capacity have been noted in areas such as the City of Kent and King County Water Districts 94, 105, and 111 (King County Department of Building and Land Development, pers. comm.); these capacity deficiencies have not been comprehensively documented. Lack of adequate water systems has been an important concern in developing the Tahoma/Raven Heights Community Plan (Monohan, 1980). Also, in some rural areas, water systems are not sufficient to meet county fire flow requirements.

Impacts of Growth. Growth projected for the study area will generate additional needs for regional water supplies and local water system improvements. Study area growth is primarily responsible for the need for Seattle to develop an additional surface water supply, since 90 percent of the population growth projected by Seattle's Complan is projected to occur in "suburban purveyor areas", incorporating most of the study area. The Complan project's total costs, through the year 2025, will be $221 million.

At the local level, numerous local water system improvement projects will be required to serve projected growth. Many of the needed local water improvement projects have been identified in the comprehensive water plans prepared by water purveyors within King County. If planned water system improvement projects are not implemented in a timely fashion, growth could create local water system capacity problems.

Drainage and Flood Control

Existing Management System. Local drainage facilities planning and implementation are the responsibility of cities and counties within the study area. The Army Corps of Engineers is responsible for several major flood control drainage projects. The Corps has also widened and deepened the Sammamish River Channel to prevent flooding, and periodically dredges the Duwamish River and Lake Washington Ship Canal to maintain navigation.

Existing Capacity Problems. The urbanization process, through development in flood-prone areas and through paving of previously permeable surfaces, increasing runoff volumes and flow rates, creates the need for drainage and flood control measures. At the local level, drainage improvement projects to manage increased storm flows can be found in the capital improvements program of virtually every local government within the study area. Many local drainage problems were identified as part of the RIBCO urban drainage study in 1975.

At the regional level, the major existing drainage problem within the study area is flooding along tributaries to the Green River caused by insufficient capacity of the river to handle peak storm flows. To minimize flood damage and also ensure continued multiple use of the Green River, the Green River Basin Program was initiated by several local agencies in 1978.

Impacts of Growth. Projected population growth will generate the demand for additional drainage and flood control facilities, as well as for nonstructural control measures. These drainage facilities include both the types of trunk drainage facilities described in the RIBCO urban drainage study (e.g., holding ponds, drainage channels, streambank protection with riprap, erosion control weirs, pumping stations, levee improvements) and local collector facilities. If drainage programs are not implemented in a timely fashion, growth could continue to create both local and regional drainage and flooding problems.

The financing of drainage system maintenance in King County is an important service issue for the future. Currently, the county requires developers to maintain residential stormwater control facilities for only 1 year following construction, after which the county "may" take over responsibility. A countywide surface water utility district has been discussed as a method for financing drainage system maintenance, the costs of which have been estimated at $42.5 million over the next 30 years (Penhole, 1980b).

Solid Waste Management

Existing Management System. The local solid waste management system involves the basic steps of collection, transfer, and disposal. The King Subregional Council is the Solid Waste Management Board for King County. Most of the solid waste in the study area is collected by private companies. King County and the City of Seattle operate the main transfer stations and landfills which serve the study area. The Cedar Hills landfill is the major landfill serving the study area, and will play an even greater role in solid waste disposal as rural landfills within King County are phased out. The Cedar Hills landfill has enough capacity to last for approximately another 20 years (King County Department of Building and Land Development, pers. comm.). The feasibility of establishing waste-to-energy conversion plants as an alternative to continued landfilling is currently being studied by King County.

Existing Capacity Problems. No near-term capacity problems appear to exist with the solid waste management system.

Impacts of Growth. Growth projected for the study area will generate additional needs for solid waste transfer and disposal facilities. A rough estimate of the additional solid waste generated by population growth can be made using the RIBCO solid waste plan per capita figures of 19.77 pounds per capita per day for solid waste generation and 5.74 pounds per capita per day for solid waste remaining for ultimate disposal; these figures include residential, commercial/industrial, and special wastes. Using these figures and the PSCOG policy projection for the year 2000, solid waste generation within the study area can be projected to increase from 1.94 to 2.91 million tons per year between 1980 and 2000, and solid waste remaining for disposal can be projected to increase from 0.56 to 0.84 million tons per year.

Recreation

Existing Management System. A number of federal, state, and local agencies provide recreation services to study area residents. Within the study area and its vicinity, residents enjoy a wide range of recreation opportunities. In particular, rivers, lakes, marine shorelands, and the inland waters of Puget Sound offer many opportunities for water-oriented recreation.

Existing Capacity Problems. King County's draft General Development Guide distinguishes among four types of parks: neighborhood (5-10 ac), community (20-40 ac), resources-based (1-100 ac) and major urban (at least 100 ac). No comprehensive data on park capacity problems exist. Through the communities planning process, deficiencies in one or more of these types of parks have been noted within different communities planning areas. In addition, a Bureau of Outdoor Recreation (1977) study of the recreational needs of the study area and its vicinity identified boating facilities, swimming beaches, and shoreline access as high priority recreational needs common to all local jurisdictions.

Impacts of Growth. Growth projected for the study area will generate additional demands for parks and recreation facilities. The King County draft General Development Guide recommends 5 acres per thousand persons as the standard for major urban parks (the draft General Development Guide also contains standards for neighborhood and community parks, but within built-up areas only). Using this standard, the projected increase in population for the study area of 321,000 between the years 1980 and 2000 would require 1,600 acres of additional major urban parks.

Social Services

Existing Management System. Schools and police and fire protection typically fall within the category of social services. Schools within the study area are run by 15 independent school districts. Centralized administrative support is provided by Educational Service District (ESD) 121 in King County and ESD 189 in Snohomish County. Police and fire services within the study area are provided by cities within their boundaries and by counties in unincorporated areas.

Existing Capacity Problems. No comprehensive data exist regarding existing capacity problems of schools, police, or fire services. Through the communities planning process, deficiencies in one or more of these services have been noted within individual communities planning areas. As a general rule, schools are seldom provided for in advance of development, and school capacity is often the major social service concern in rapidly growing areas.

Impacts of Growth. Projected population growth will generate demand for additional social services. If these services are not provided in a timely fashion, the quality of social services within the study area could deteriorate.

It is possible to estimate the number of additional students who will require classrooms by using ESP 121's planning rule of thumb estimate of 20 students per 100 persons added within King County. Using this figure, the projected increase in population for the study area of 321,000 between the years 1980 and 2000 would generate an additional 64,200 students. Of course, schoolroom capacity would not be needed for all 64,200 at one time, since students generated early in the planning period would be leaving the public school system prior to the year 2000.

Transportation

Existing Management System. Management of roads and highways within the study area is the responsibility of the federal and state Departments of Transportation, PSCOG, and cities and counties. (This section is limited to examining the impacts of projected growth on roads and highways, and does not consider airports, railroads, or ferry services.) Metro is responsible for operating the regional mass transportation system.

Existing Capacity Problems. Capacity problems exist for both local roads and regional highways. Some of these have been identified in communities plans. PSCOG is in the process of identifying regional and subregional highway problems as part of its current updating program for the 1990 Transportation System Plan.

Impacts of Growth. Projected population growth will generate additional person-trips and vehicle-miles travelled. Many highway and transit improvements have been programmed by PSCOG, local governments and Metro to meet projected demands. Metro's 10-year capital expenditure needs for transit improvements alone were recently estimated at $1.9 million (Penhole, 1980a). If transportation facilities and services are not provided in a timely fashion to meet increased demands, or if strategies to reduce vehicle-miles-travelled are unsuccessful, additional congestion and increased travel times could result. This could have localized air quality impacts.

A good indicator of the increase in transportation demand is the number of home-to-work trips. Table 6-10 shows PSCOG's projection of home-to-work/college trips by place of residence and place of work for 10 planning districts in Pierce, King, and Snohomish Counties. The trip projections are based on PSCOG's policy population projection, identical to that used for Metro's wastewater facilities planning. The data in Table 7-10 indicate that the five transportation planning districts located within the study area are all expected to show significant increases in trips from home and trips to work.

Electricity and Gas

Existing Management System. Electricity is supplied to most of the study area by Puget Sound Power and Light (PSP&L); in Snohomish County, electricity is supplied by Snohomish Public Utility District. In 1979, 78 percent of the electricity supply by PSP&L came from hydroelectric plants, with thermal sources accounting for the remaining 22 percent.

Natural gas is supplied in the study area by Washington Natural Gas. Supplies are purchased from the Northwest Pipeline Corporation.

Table 7-10. Projected Home-Work/College Trips by Place of Residence and Place of Work

	Trips from Home in this District			Trips to Work in this District		
District	1977	2000	Percent Change	1977	2000	Percent Change
1. Tacoma/Lakewood	157.2	216.9	+ 38.0	179.1	255.4	+ 42.6
2. Puyallup, Spanway, S. E. Pierce County	88.2	192.7	+118.5	41.1	103.9	+152.8
3. Federal Way, Auburn, Kent, Maple Valley*	119.8	234.6	+ 95.8	83.5	175.7	+110.4
4. Renton, Tukwila, Barien, Sea-Tac*	137.0	168.1	+ 22.7	113.3	182.7	+ 61.3
5. Seattle, South of Ship Canal	201.5	227.4	+ 12.9	412.6	505.9	+ 22.6
6. East Lake Washington*	184.3	286.9	+ 55.7	104.4	186.1	+ 78.3
7. North Seattle's Shoreline	203.6	212.7	+ 4.5	199.7	239.5	+ 19.9
8. Montlake Terrace, North Creek, Alderwood Manor*	37.0	103.7	+180.3	9.2	33.1	+259.8
9. Edmunds, Lynnwood*	69.6	114.0	+ 63.8	39.9	88.4	+121.6
10. Everett and Suburban Areas	63.0	129.0	+104.8	82.3	144.2	+ 75.2
County Totals						
Pierce	245.4	409.6	+ 66.9	220.2	359.3	+ 63.2
King	846.2	1,129.7	+ 33.5	913.5	1,289.9	+ 41.2
Snohomish	169.6	346.7	+104.4	131.4	265.7	+102.2

*Denotes districts within Lake Washington/Green River Basins.

SOURCE: PSCOG, 1979a.

Existing Capacity Problems. The near-term outlook for electricity supplies in the study area is uncertain. That electricity supplies could be a problem is best demonstrated by a pending petition filed in late 1979 by PSP&L with the Washington Utility and Transportation Commission. This petition requests a 4-year restriction on new electricity hook-ups where other fuel types would be more efficient or where supplies are more available; the main effect of this petition would be to limit new hook-ups for residential space heating or water heating. In contrast to the electricity outlook, the near-term outlook for natural gas within the study area is considered good.

Impacts of Growth. Population growth projected for the study area will generate additional energy demands. Current uncertainties in factors such as the future of nuclear power, energy pricing policy, and the role of conservation, among others, make projections of 20-year energy demand and supply quite difficult, and such projections are not attempted here.

Mitigation Measures for Public Services Impacts

In an effort to assure the coordination of growth and provision of public services, local agencies within the study area have developed numerous comprehensive and special purpose (functional) plans and policies. The status of plans and policies is described in detail in Appendix A of this EIS. Some of the more important plans and policies affecting public services provisions are listed below.

Comprehensive Plans. King County General Development Guide (first draft), community plans in King and Snohomish Counties, comprehensive plans prepared by cities.

Wastewater Management Plans. Sewer district comprehensive plans, King County Sewerage General Plan, Metro Resolution 2933, nonsewer policies of Seattle-King Counties and Snohomish County Health Departments.

Water Supply. Water district comprehensive plans, Seattle Complan.

Drainage and Flood Control. Metro 208 plan, local government drainage policies, Green River Basin Program.

Solid Waste Management. King County Solid Waste Management Plan.

Transportation. PSCOG 1990 Transportation System Plan update, PSCOG subregional transportation plans.

To the extent that these and other local plans and policies regarding public services provision are implemented, the potential adverse impacts of growth on public services will be mitigated; if public services plans and policies are not successfully implemented, localized service deficiencies could create changes in growth patterns, but these are unlikely to be of sufficient magnitude to affect the study area's projected growth rate or the phasing of Metro's wastewater facilities. At this time, development of additional mitigation measures as part of this EIS does not appear warranted.

Secondary Impacts on Public Finance

Background

Growth accommodated by the Metro Wastewater Management Plan will affect the balance between public costs and revenues. Public costs are incurred with the provision of services such as police, fire protection, streets and roads, water, sewers, libraries and public health. Revenues are obtained from property taxes, sales taxes, utility taxes, charges for services, fines and transfers from other (such as state and federal) governments.

The municipal budgeting process and collection of revenue to pay for public services are governed by a well-defined set of regulations. According to Washington state law, local government budgets must be balanced; that is, revenues must equal costs.

The amount of revenue collected is not specifically limited, but there are some constraints. Revenue from property taxes in any year may not exceed 106 percent of the largest property tax collection in the previous 3 years, with three exceptions: (1) voters may suspend this limitation one time only, for a period of 1 year; (2) voters may authorize the sale of general obligation bonds to be repaid by an extra property tax levy; and (3) new development may be added to the collection base subject to certain rules. Sales tax receipts are derived from a distribution of state sales tax revenues. Municipal bonds, issued by local governments to cover capital costs, are limited by the total assessed valuation in the jurisdiction (for general obligation and local improvement district bonds) or the revenue of the enterprise (for revenue bonds).

Responsibility for Provision of Services

Public services in the study area are provided by a combination of local government entities. Within cities, King County is responsible for county streets and roads; health; law, safety, and justice (excluding police); solid waste collection; and some parks. The city provides general government, police and fire protection, parks and recreation, water and sewer services. Some cities also provide libraries. In unincorporated areas of the county, King County provides general government; streets and roads; law, safety and justice (including sheriff); solid waste collection; and parks and recreation. Fire protection, water and sewers are provided by special districts.

Further details regarding the existing management system for study area public services may be found in the previous section assessing secondary public services impacts.

Fiscal Outlook of the Study Area

Interviews were held with finance officers and city treasurers in the seven largest cities in the King County portion of the study area and with staff of the King County budget division to assess the fiscal outlook. Officials in six of the seven cities - Auburn, Bellevue, Kirkland, Kent, Redmond, and Renton - indicated that the fiscal conditions and outlooks of those cities are similar. In all six, diversified tax bases provide substantial property and sales tax revenues. Continuing development, especially of commercial and industrial uses, allows property tax collections to increase at a greater rate than 6 percent per year and helps in covering the cost of services to residential areas. Sales tax receipts, which rise not only with new commercial development but also with inflation and real income gains (the amount by which increases in income exceed inflation), contribute additional funds.

Several of the cities place major importance on user fees to generate revenue not only for water and sewer service but also for development processing and recreation programs. A notable example is the City of Kent, which serves a large population in the unincorporated area around the city, and charges for services in an effort to assign the costs of those services to the people who actually use them. Several of the cities have additional sources of revenue - such as business and occupation tax and gross receipts tax - available to them when the constraints imposed by the 106 percent limit become too severe. All of the cities have major portions of their bonding capacity uncommitted, and none has had trouble passing bond issues when they have been submitted to the voters. In general, these cities have adopted a conservative approach to budgeting, overestimating expenses and underestimating revenues, in an attempt to maintain solvency and respond adequately to the service needs and demands of their residents.

There are, nonetheless, some differences among these six cities. Some have substantial cash reserves available to cover emergency funding requirements, while others have virtually none. Some of the cities anticipate significant population growth in the future, in some cases involving annexations as well as new development within current city boundaries, while others expect only minor infill development.

Officials in the six cities expressed confidence in their fiscal soundness and their abilities to handle future growth. They based this optimism on increasing sales tax revenues, future possibilities of additional revenues from other sources (user charges, business and occupations tax), the future possibility of suspending the 106 percent property tax limit and careful management practices.

The seventh city, Mercer Island, differs from the other six in several ways. It is completely contained by the island, almost fully developed and almost completely residential. The residential character of development means that the city must rely heavily on property taxes for locally-generated revenues, knowing that most costs will rise at a greater rate than 6 percent per year and thus that the city's finances face continual strain in the future. Voters suspended the 106 percent limit this year, leaving that option unavailable in the future. Even the very limited potential for future population growth and the knowledge that whatever growth does occur will probably not significantly increase city costs (because it will occur within the existing framework for service provision) does not bolster the city's fiscal outlook. Smaller cities in the study area with development characteristics similar to Mercer Island are likely to find themselves in the same fiscal condition.

The King County government, which provides some services countywide and some to the unincorporated area, shares the fiscal outlook of the City of Mercer Island, although for different reasons. The services provided by the county - primarily law, safety and justice, streets and roads, and public health - are difficult or impossible to finance with user charges (parks and recreation in the unincorporated area may be an exception). Therefore, the county must rely on property and sales taxes for revenue. Its property tax levies and sales tax receipts differ, however, between the incorporated and unincorporated areas; property tax levies in the incorporated areas (city territory) are lower because the county provides fewer services there, and sales tax receipts are lower because the cities share in the revenue. The county policy which encourages new development in existing urban concentrations makes it likely that the county will receive a smaller share of the fiscal benefits from that development than it would if construction in unincorporated areas were more acceptable.

The county also has more difficulty than the cities in mounting and passing bond issues, because a county issue must be approved by residents of both the incorporated and unincorporated areas. The greater diversity of population and interests in the countywide electorate dilutes the appeal of any county proposal and requires a major political effort to adopt a bonding program.

It should be noted that neither county special districts nor Snohomish nor Pierce Counties budget officials were interviewed for this study, and consequently the foregoing description of county finances presents only a partial picture.

Mitigation Measures for Fiscal Impacts

Local jurisdictions within the study area are implementing a variety of measures to finance the public costs of growth. For example, as part of its General Development Guide program, King County is examining the fiscal impacts of four alternative development patterns, and fiscal considerations will play an important role in determining which alternative is selected. At this time, development of additional mitigation measures as part of this EIS does not appear warranted.

Chapter 8

EPA ALTERNATIVES AND PROPOSED ACTION

EPA Alternatives

Overview

EPA's objective for the 201 construction grant program is to assist public agencies in meeting their responsibility for working toward the goals of the Clean Water Act. The primary methods EPA and the State of Washington use to meet water quality goals are to establish water quality standards necessary to protect the beneficial uses of streams, and to administer the National Pollution Discharge Elimination System (NPDES), whereby effluent discharge permits contain terms intended to maintain water quality standards. EPA will consider a wastewater treatment construction grant application to assist Metro in meeting the terms of its NPDES permit, and to protect water quality.

EPA's implementation procedures for the National Environmental Policy Act (NEPA) require, in addition to considering the grant applicant's alternatives, that EISs explicitly consider alternatives available to EPA. These alternatives may include structural or locational alternatives not investigated by the grant applicant, or can be administrative only. The administrative options may include such choices as funding or not funding the proposed action; funding portions of the project; funding the project in stages; or providing a reduced or increased level of funding. Administrative options can also relate to grant conditions, including impact mitigation measures that EPA may wish to make part of any subsequent grant offer to the applicant.

New Structural Alternatives

EPA, as its discretion, may propose, within its EIS, facility alternatives in addition to those proposed by a grant applicant. In the case of Metro's Wastewater Management Plan for the Lake Washington/Green River Basins, EPA believes that Metro has examined a full range of long-term facility alternatives. These include both centralized and decentralized approaches, as well as several discharge options. Based on public and agency comments on the draft plan, Metro developed new alternatives which are presented in the final plan and analyzed in this Final EIS. These include deferral of decisions on wastewater treatment configuration for flows from the north part of the study area presently tributary to West Point. Also included was a new outfall location alternative for discharge to deep water of Puget Sound off Duwamish Head. Additional new facilities approaches do not appear warranted at this time as part of this EIS. Alternative mitigation measures could be considered prior to EPA's final decision.

Administrative Alternatives: Approval and Funding

Approve and Fund One Alternative. EPA funding is based on a determination that the applicant's preferred alternative is approvable. An approvable alternative must be cost-effective and environmentally acceptable. If these requirements are met, federal funds could be provided. Funding levels and timing would be dependent on availability of funds and funding priorities. Under the Clean Water Act, EPA may provide grants of up to 75 percent of eligible project costs. It is possible that the EPA would be able to provide 75 percent funding for only a portion of the approved program. Recent EPA construction grant annual funding for Washington State has ranged from close to $80 million in 1978 to near $60 million in 1980. Annual funds in the near future may be expected to be less than this $60-80 million range. Administration or Congressional actions or national economic trends may affect this estimate. Full EPA funding of this project could therefore be expected to require the commitment of all Washington's share of federal construction grant funds for several years. This in turn would require denying funding for other projects within Washington.

Actual distribution of federal funds to projects in Washington is determined by the State Department of Ecology. The most recent state priority list shows that design funds for this Metro project will not be available for several years. The State estimates that the maximum annual amount of federal funds made available for this project is likely to be approximately $20 million per year.

Washington voters recently passed a bond measure providing $315 million over 10 years for wastewater treatment projects. This program will be administered by the Department of Ecology. It is anticipated that this money will be used to fund projects at between 50-75 percent of eligible costs. Due to the wastewater treatment needs of small communities, Metro has in the past received only about 12 percent of the funds from past state bonding authorities. The State of Washington expects that Metro's fair share of the new bonding authority will be higher, based on the realization that a majority of the state's population and a significant portion of the state's remaining wastewater treatment needs are in the Seattle metropolitan area. Therefore, state funds may be available to supplement federal funds for this Metro project.

EPA approval of the recommended program would be approval of the entire program. Since the entire program is necessary to prevent water quality problems, EPA funding would be dependent on Metro's commitment to implement the entire program. If only a portion of the program were to be completed, EPA would not have achieved its intent in approving the recommended program, and water quality standards violations could occur.

Planning of project phasing should recognize that some portions of the recommended program are essential to achieve water quality objectives. For example, under the recommended program, project phasing should guarantee that the tunnel and outfall will come on-line in time to transfer to Puget Sound any major increased discharge from the treatment plant. If major increased discharge preceded completion of the tunnel and outfall, unacceptable water quality impacts in the Duwamish River might occur.

Approve and Fund No Alternatives. If the applicant's preferred alternative is not found to be cost-effective and environmentally acceptable, EPA approval requirements would not be met and federal funds could not be provided. Also, if no funds were appropriated by Congress for the 201 program, no funds could be provided, even for an approvable plan. In either of these cases, the applicant's preferred alternative would need to be funded entirely from state and local sources; otherwise, it might not be built. In the former case, increases in costs to local ratepayers might be expected. In the latter case, impacts such as those discussed in this EIS under the no-project alternative could be expected, including serious water quality and fisheries impacts.

Approve and Fund More than One Alternative. If more than one alternative were found to be cost-effective and environmentally acceptable, EPA could approve and fund whatever cost-effective and environmentally acceptable alternative was preferred by the grant applicant. The discussion above, concerning funding availability and timing, would still be applicable in this case.

Funding of Project Phases. If Metro proposed to confirm the West Point "de-emphasis" policy at this time and transfer to Renton flows from the north study area now going to West Point, Metro would stage design and construction in two phases. Phase 1, consisting of expansion of treatment plant and solids handling facilities of 72 MGD, the effluent tunnel/outfall, and Phase 1 of the Redmond connection, would start in 1981 and be complete by 1985. Phase 2, consisting of expansion of treatment and solids handling capacity to 99 MGD, Phase 2 of the Redmond connection, and the North Creek/Hollywood connection, would start in 1986 and be complete in either 1991 or 1993, depending on the facility.

In this case EPA would provide initial federal funding for only Phase 1 of the preferred program. An alternative would be to provide funds at this time for both phases; this alternative does not appear necessary given funding constraints, the relative independence of the two phases (i.e., Phase 2 is not a necessary part of Phase 1), and their separation in time.

Funding Beyond the 20-Year Capacity. EPA cost-effectiveness guidelines require that cost-effectiveness analyses be based on a planning period of 20 years. As a general rule, EPA does not fund facilities beyond their 20-year capacities. If Metro's recommended program is selected, it is unlikely that EPA would fund the tunnel and outfall to Puget Sound beyond their 20-year capacities. The costs of additional incremental capacity would therefore need to be funded entirely from local sources.

Administrative Alternatives: Grant Conditions

A number of potential adverse environmental impacts have been identified throughout this EIS. In many cases measures can be taken to mitigate these impacts. Mitigation measures have been discussed at various places in the body of this EIS and are summarized in the EIS SUMMARY (Table S-1). Specific mitigation measures are the responsibility of various federal, state or local agencies. For example, several agencies have responsibilities to implement 208 plan recommendations necessary to mitigate nonpoint source impacts of urbanization on surface water in the study area. Certain mitigation measures can also be taken by Metro.

Where EPA determines that mitigation measures are necessary to prevent or minimize unacceptable adverse impacts of the selected project, and that such measures could be taken by Metro, EPA may place conditions on the award of subsequent grants to require that Metro take appropriate mitigative actions. Grant conditions can include specific monitoring requirements, requests for supporting ordinances, and a variety of other controls on the construction and operation of the wastewater treatment and disposal facilities.

EPA regulations require EPA to ensure that a grantee has the authority to fulfill grant conditions. Suggested mitigation measures not included as grant conditions, which are beyond Metro's authority, were included in the EIS to give the public an idea of measures that could be implemented, and which agencies have responsibility for them. Although these additional measures are not part of the proposed action, and the proposed action is not dependent on them, EPA believes it is appropriate to present them in the EIS.

Proposed Action

Evaluation of Alternatives

Facilities plan alternatives were evaluated by EPA according to a set of specific decision criteria. These criteria reflect those factors considered by EPA to be most important to the decision, based on analysis of technical information in the EIS and public and agency comments. Generally, criteria were included based on EPA judgement concerning the importance and distinctness of the issue, the measurability of alternatives' effects in terms of the issue, and the difference among alternatives' effects in terms of the issue. Decision criteria were explicitly prioritized and weighted for use in evaluating alternatives. Weights were assigned based on EPA judgement concerning degree of public concern, EPA legal requirements, and the magnitude and duration of effects.

The selected decision criteria and weights are as follows:

Criteria	Weight
1. Public health, considering public exposure to contaminants such as pathogens and heavy metals.	130
2. Economic effect on salmon, bottom fish and shellfish populations.	120
3. Possibility of cumulative water quality deterioration in Puget Sound.	120
4. User rate increases.	120

Criteria	Weight
5. Present net worth.	105
6. Potential for water quality standards violations.	90
7. Flexibility to respond to future new information, conditions, or decisions.	80
8. Risk and consequences of plant upset.	65
9. Construction impacts to neighborhoods and parks.	65
10. Landslide and seismic risk.	65
11. Cost-sharing potential with CSO projects.	40
Total	1,000

EPA rated eight alternatives according to these decision criteria. The alternatives rated were as follows:

No Project

A-1 - Secondary treatment with nitrification at Renton; discharge to Duwamish River.

A-3 - Standard secondary treatment at Renton; discharge via tunnel and outfall off Seahurst Park.

A-5 - Standard secondary treatment at Renton; discharge via tunnel and outfall off Alki Point.

B-1 - Secondary treatment with nitrification at Renton with discharge to Duwamish River; new secondary plant at Kenmore with discharge via tunnel and outfall off Richmond Beach.

A-1' - Same as A-1 but with deferred decision on north study area.

A-3' - Same as A-3 but with deferred decision on north study area.

A-5' - Same as A-5 but with deferred decision on north study area.

The purpose of the evaluation system is to clarify for decision makers and the public the key factors that led to the preferred action.

Selection of the Preferred Action

EPA proposes to approve for federal funding a long-term wastewater management program for the Renton study area, including expansion of the Renton treatment plant's secondary treatment capacity to 72 MGD by the year 1990, construction of solids handling facilities at the Renton treatment plant site, and construction of a tunnel and outfall for discharge of treated effluent to Puget Sound.

Metro's draft plan considered two alternative locations for the Puget Sound outfall: Alki Point and Seahurst Park. EPA finds that, based on environmental criteria alone, excluding costs, Alki Point is an environmentally preferable discharge location. This is due to the greater circulation of Puget Sound waters off Alki, compared to Seahurst, which allows much more rapid dispersion of effluent off Alki. This is important in relation to concern about long-term water quality trends in Puget Sound, especially in shallower embayments.

A plan including a Seahurst outfall has a present net worth cost which is $66 million less than the cost of a plan with an Alki outfall. This EIS has concluded, based on all available information, that no major adverse impacts to Puget Sound can be predicted with a Seahurst outfall. Therefore, EPA considers a plan with a Seahurst outfall to be the cost-effective alternative, and to be environmentally acceptable.

From a technical standpoint, EPA has been unable to conclude that the environmental advantages of the Alki site represent overriding concerns. Such a conclusion would be necessary for EPA to approve an alternative other than the cost-effective alternative. However, this is largely because little can be conclusively stated about long-term cumulative impacts to Puget Sound, especially to the area south of Alki Point, from major municipal discharges. Therefore, the conclusion as to possible overriding benefits of an Alki discharge is, to a great extent, a judgement about the desired degree of risk avoidance in the face of poorly known future conditions. An Alki discharge would provide a greater degree of certainty that long-term problems would be avoided.

EPA believes that the judgement as to the desired level of risk-avoidance is a decision in which local citizens, acting through their elected officials on the Metro Council, should have a major voice. EPA will therefore make a final decision on potential overriding benefits of an Alki discharge, based on the decision of the Metro Council. If the Metro Council selects a plan with a Seahurst discharge location, and that plan is certified as acceptable by the Washington

Department of Ecology, EPA would approve that plan for federal funding. If the Metro Council concludes that the relative advantages of the Alki discharge location are overriding considerations, and selects a plan with an Alki discharge location, and DOE certifies that plan, EPA would consider that as persuasive evidence that Alki has overriding benefits and would approve that plan for federal funding. Due to severe constraints on the availability of federal grant funds for wastewater treatment facilities, EPA does not predict that additional federal funds will be available for an Alki plan beyond what would be available for a Seahurst plan. Therefore, the cost increase of the Alki plan would have to be assumed by state and/or local sources.

Regardless of the selected outfall location, EPA believes that there is a need for additional studies as part of the design of the selected route, and for monitoring of outfall performance and Puget Sound water quality conditions. Various grant conditions and recommendations are presented below which address these concerns.

Rationale for Key Trade-Offs

Rationale for Centralized Treatment Plant. A centralized plant configuration was found to be less expensive in most cases than a dual configuration including both Renton and Kenmore plants. A centralized system also avoids the construction impacts of a new plant and an additional tunnel and outfall. Further, it reduces the potential for effluent contact with more than one recreational beach area. Although addition of a Kenmore plant and outfall increases overall system reliability and may decrease potential long-term effects on Puget Sound or Elliott Bay, these considerations were not felt to counter-balance the advantages of a centralized system. No major difference between the two configuration strategies were found in the areas of water quality standards, fisheries, or seismic hazards.

Rationale for Deferring North Service Area Decisions. The proposed action would defer the decision on the issue of where to treat future wastewater flows from the North Lake Washington/Lake Sammamish area. That area is presently connected to Metro's West Point plant. Although a decision now would provide greater public certainty about future conditions, a deferred decision offers the possibility of substantial cost savings and a more logical overall wastewater system. Adding the north service area to the Renton system would provide a greater proportion of secondary treatment for regional wastewater. However, leaving that area in the

West Point system, in addition to avoiding the costs and impacts of connection facilities and greater operation and maintenance costs, provides more flexibility to respond to changes in service area growth, and discharges more effluent in northward-flowing waters of Puget Sound.

Rationale for Diverting Discharge from Duwamish River to Puget Sound. The overriding factor favoring diversion from the Duwamish River is the ability to avoid water quality standards violations and possible losses to the valuable salmon fishery and to bottom fish. These problems would exist even if nitrification is added to the treatment process. There will not be water quality standards or fisheries problems with a Puget Sound discharge. On the other hand, diversion entails construction impacts from the tunnel and outfall, the possibility of diluted effluent contacting popular recreational beaches, and the need to construct nonmodular facilities sized for 50-year loads. No major differences were found in the area of cost, assuming a Seahurst discharge, or in the area of long-term Puget Sound impacts. Overall, the judgement of EPA decision makers is that the water quality and fishery concerns, especially considering the greater possibility of plant upset with more sophisticated treatment, outweigh the relatively short-term construction impacts, and the possibility of effluent contacting beaches. No adverse impact to the beneficial uses of beaches is expected from occasional contact with diluted effluent.

Rationale for Alternative Puget Sound Discharge Locations. A Seahurst discharge would experience occasional periods of several days or more of very poor dispersion in which diluted effluent would remain in the central East Passage area, before moving south. Some effluent would probably move into Commencement Bay and south Puget Sound before exiting north through Colvos Passage. With an Alki discharge, there would probably be good dispersion to the north within a few days under all tidal conditions, with little movement of effluent south of Alki Point. An Alki discharge would therefore offer greater protection against any possibility that diluted effluent might contribute over time to cumulative impacts to Puget Sound south of Alki. It is not presently predicted that cumulative impacts could be expected with a Seahurst discharge, but little conclusive information exists as a basis for prediction.

A plan with a Seahurst outfall would be $66 million less expensive, in present net worth terms, than a plan with an Alki outfall. The Seahurst route also would have slightly less construction impact than the Alki route. Although the Alki route has a shorter tunnel length, it would require over 10 miles of open cut construction and would involve more neighborhood disruption. An Alki route has the advantage of providing opportunities for cost sharing with combined sewer overflow control projects, if such projects were undertaken.

The Alki and Seahurst outfall locations appear to be largely equivalent in terms of public health concerns, fisheries, water quality standards, reliability, and seismic or landslide hazards. Overall, the choice seems to be whether the greater long-term risk-avoidance of an Alki discharge is worth its greater cost.

Proposed Grant Conditions

The following grant conditions are intended by EPA to mitigate certain potential adverse impacts identified in this EIS. Several are intended to provide for additional study after selection of the preferred plan. These include conditions concerning additional cultural resources, geotechnical, and oceanograhic studies; a construction site plan and site restoration plan; a spoils disposal plan; and a monitoring plan. Other conditions pertain to project construction timing, to ensure that discharge facilities are completed prior to the onset of major new outputs from treatment facilities. Another condition is intended to meet EPA policies on agricultural lands, floodplains, and wetlands, while affirming the authority of local land use agencies over land use planning decisions.

Several additional recommendations are also made which encourage implementation of various ongoing studies:

Proposed grant conditions are as follows:

1. Prior to construction Metro shall ensure that an historical/archeological survey is conducted for the selected tunnel/outfall route and at any other construction sites other than the Renton treatment plant. The results of the survey shall be sent to the State Historic Preservation Officer (SHPO). Any subsequent recommendations by the SHPO shall be formally considered in accordance with requirements of Section 106 of the National Historic Preservation Act. Any SHPO recommendations shall be forwarded to EPA. If cultural resources are discovered during construction at the Renton treatment plant, construction shall stop until a professional archeologist has assessed the significance of the resources.

2. Prior to construction, Metro shall prepare and submit to EPA and the Washington State Department of Ecology its proposed water quality monitoring plan for the Renton Puget Sound discharge. The monitoring plan shall include at least the proposed parameters to be measured, sampling locations and sampling frequency. EPA and DOE shall have the opportunity to review and comment on the proposed monitoring plan.

3. During predesign work, Metro shall conduct detailed geotechnical and oceanographic studies of the selected tunnel/outfall location. The scope of work for these studies shall be made available to the public and shall be submitted to EPA and DOE. These studies shall include, at a minimum, an identification and assessment of soil instability and seismic hazards along the route, based on site-specific investigations, and development of siting or construction methods to reduce risks to acceptable levels. The results of the detailed studies shall be reported in a document which will also be available to the public and submitted to EPA and DOE for review. Metro shall hold a public meeting to discuss the results of these studies, and a responsiveness summary for the meetings shall be prepared.

4. Before any EPA construction funds are awarded, Metro shall have an approved sludge disposal plan.

5. Metro shall establish a formal procedure to ensure that, prior to any new interceptor extension or connection to the Renton system, local land use agencies shall evaluate, with public input, the potential impacts of sewered development on environmentally sensitive areas. Those include prime agricultural lands, wetlands and floodplains. The procedures shall stipulate that consideration be given to alternatives that would avoid adverse impacts and recommendations to mitigate adverse impacts.

6. Should connections which transfer wasteloads from the West Point system to the Renton system be found cost-effective in final West Point facilities planning, Metro shall ensure that construction of the selected tunnel and outfall from the Renton treatment plant will be completed prior to completing construction of any such West Point system connection.

7. Before construction, Metro shall prepare a plan, in coordination with EPA and DOE, which sets out the measures that will be taken to minimize adverse impacts to Seahurst Park from construction of the tunnel and outfall, if Seahurst is the selected outfall location. The plan shall also include measures that will be taken to complete restoration of the park, after construction is completed. These measures shall be incorporated into construction contracts. The restoration plan shall include an estimate of the time required to complete restoration.

8. Metro shall prepare a spoils disposal plan. The plan shall include specific methods and locations for handling and disposal of spoils from tunnel construction, and shall present measures to minimize adverse impacts from spoils storage and disposal.

EPA additional recommendations are as follows:

1. EPA recommends that appropriate local agencies take every available action to ensure that the facilities plan recommendations for management of on-site wastewater systems in the nonsewer area are implemented. Of specific concern is the need to develop a management system for subsurface system maintenance and solids disposal in King County.

2. EPA encourages Metro to continue to investigate and implement measures to minimize near-term water quality problems in the Duwamish River during design and construction of diversion facilities.

3. EPA recognizes the importance of the "Duwamish Pollutant Inventory" study and recommends that Metro work actively with appropriate agencies to ensure implementation of the recommendations of that study.

4. EPA recommends that PSCOG and Metro work closely together to develop realistic 50-year wasteload forecasts for the purpose of sizing nonmodular facilities.

5. The Washington State Department of Ecology has begun a Puget Sound sensitive area study to identify and prioritize sensitive areas, develop a monitoring strategy, and develop DOE program direction, in coordination with other agencies. EPA believes this is an important first step toward gaining an understanding of water quality trends in Puget Sound. EPA encourages DOE to build on this plan

by implementing the chosen monitoring strategy, so as to acquire information about long-term Puget Sound water quality conditions, in relation to wastewater discharges.

Chapter 9

COORDINATION

Introduction

Section 6.203 of EPA's procedures for implementation of the National Environmental Policy Act requires that EISs discuss the extent and results of coordination activities conducted prior to publication of EISs. This chapter describes the involvement of government agencies, interest groups, and the public in general in determining the scope and content of this EIS. Public participation activities for the Wastewater Management Plan and EIS are further documented in Metro's Public Hearings and Meetings Summary dated April 1981, and in Metro's public participation Compendium, a limited companion document to the Wastewater Management Plan.

Public Participation

Public participation for this EIS has been coordinated, and, where possible, integrated with the full-scale public participation program undertaken by Metro in preparing its Wastewater Management Plan. Key EIS public participation activities to date are summarized below.

Information Brochure

In August 1979 EPA published a brochure entitled Decisions on Water Quality in the Renton Area. This widely-distributed brochure provided background information on the Wastewater Management Plan being prepared by Metro, listed and discussed key issues for the EIS, described EPA's role in decision making and in preparing the EIS, and identified future public involvement opportunities. The brochure also included a Notice of Intent inviting members of the public to attend the initial project "kickoff" and scoping meetings.

Scoping Meeting

An initial kickoff/scoping meeting was scheduled for September 16, 1979. Because attendance was much larger than anticipated and exceeded the capacity of the meeting room, the kickoff/scoping meeting was rescheduled and held on October 17, 1979.

Because the kickoff/scoping meeting was jointly held by Metro and EPA, both wastewater planning and EIS issues were discussed. In addition to Metro's presentation, presentations were made by EPA staff and the EIS consultant regarding EPA's role in preparing the EIS and some of the important issues that would be addressed in the EIS.

Following the presentations, most public comments addressed the Wastewater Management Plan. However, one issue was raised by a citizen regarding the importance of air quality considerations in the EIS. This citizen felt that the EIS should consider the inadequacy of the existing monitoring station network for carbon monoxide within the study area; without more monitoring stations in certain "hot spots", the commenter felt, it would be difficult to predict and mitigate the air quality impacts of future growth in the study area. The EIS consultant responded at that time that the EIS would probably not undertake new efforts to predict and mitigate future air quality problems unless the population projections used for wastewater planning were inconsistent with those used for the Washington State Implementation Plan; these population projections have been determined to be consistent in this EIS (see Chapter 6).

Notice of Intent

On October 2, 1979, EPA's formal Notice of Intent to prepare an EIS was published in the Federal Register.

Presentation to Wastewater Plan Citizens Advisory Committee

On January 23, 1980, the EIS consultant presented a status report on the EIS to the Renton 201 Citizens Advisory Committee. The different emphases of the Wastewater Management Plan and EIS were discussed.

Public Meeting on Alternatives

On February 6, 1980, Metro held a public meeting to obtain public input on the advantages and disadvantages of various wastewater management alternatives. EPA staff and the EIS consultant attended this meeting, gave a short presentation on the status of the EIS, and participated in the small group discussions which were the focus of the meeting.

Public Meetings on Preliminary Plan

In mid-May 1980, Metro held a series of public meetings on its preliminary plan; in these meetings the contents of the plan were discussed by Metro staff and consultants, followed by a question-and-answer session. EPA staff or the EIS consultant were in attendance at each of these meetings. Two questions arose specifically related to the EIS: 1) whether the EIS would focus on a preferred action or alternative actions, and 2) whether the EIS would address the land use impacts of a Kenmore treatment plant.

Public Meetings and Hearings on Draft Plan and EIS

Five public meetings and two public hearings were held by Metro and EPA in January 1981 to receive comments on Metro's Draft Wastewater Management Plan and EPA's Draft EIS. Legal notices of the meetings and workshops were mailed on December 4, 1980. On that day, about 2,000 copies of the draft plan and EIS summaries were mailed to persons who had previously indicated interest.

The Metro/EPA public informational meetings were:

January 6, 7:00 p.m., Alki Congregational Church, West Seattle -- chaired by R. R. "Bob" Greive, King County Council member from District 8 and Metro council member. About 150 persons attended.

January 7, 7:30 p.m., Puget Sound Power and Light Auditorium, Bellevue -- chaired by Bruce Laing, King County Council member from District 6 and Metro Council Water Quality Committee member. About 30 persons attended.

January 13, 1981, 7:30 p.m., Burien Public Library, Burien -- chaired by Beth Bland, Mayor of Mercer Island and chairman of the Metro Council Water Quality Committee. Over 175 persons attended.

January 14, 1981, noon, Fourth Floor Conference Room, Exchange Building, Seattle -- chaired by Michael Hildt, Seattle City Council member and Metro Council Water Quality Committee member. About 35 persons attended.

January 15, 1981, 7:30 p.m., Kent City Council Chamber - Kent -- chaired by Gary Grant, King County Council member from District 9 and Metro Council Water Quality Committee member. About 20 persons attended.

The Metro/EPA public hearings were:

January 21, 1981, noon, Fourth Floor Conference Room, Exchange Building, Seattle.

January 2, 1981, 7:00 p.m., Puget Sound Power and Light Auditorium, Bellevue.

Both public hearings were chaired by Beth Bland, Metro Council Water Quality Committee chairman. About 120 persons attended the Seattle hearing, and about 40 persons attended the Bellevue hearing.

Persons attending the public meetings and hearings had numerous oral and written comments on the draft plan and EIS. EPA has transcripts of the public hearings available for public review at the EPA, Region 10 offices. The most frequently made comments were responded to by Metro, with EPA's assistance, in Metro's Responsiveness Summary, which was mailed in April 1981 to persons attending the meetings and hearings, and other persons who had previously indicated interest. Metro is also preparing a public participation Compendium documenting all its public participation activities during facilities planning.

Written Comments on Draft EIS

The Draft EIS review period was initially set for 45 days, and was later extended to 60 days, ending on February 17, 1981. Agencies, organizations, and individuals were encouraged by EPA to comment on the EIS in writing.

All written comments received on the Draft EIS are reproduced in Chapter 12 of this Final EIS, together with EPA responses to each comment. The letters in Chapter 12 include those directly addressed to EPA, as well as those addressed to Metro and carbon-copied to EPA. General responses to the most frequently made comments have been prepared, and are presented in the Final EIS FOREWORD.

Schedule for Remaining EIS and Plan Activities

The Final EIS will have a 30-day review period, during which EPA will receive and consider written comments. The mailing list for the Final EIS is shown in Table 9-1.

A full public review process has been scheduled for the Final EIS and final Metro plan. Over 200 copies of the Final EIS and about 3,000 copies of a summary of the EIS are being distributed for citizen and agency review and comment.

Table 9-1. Mailing List for Final EIS

FEDERAL AGENCIES

Mr. Bruce Blanchard, Director
Office of Environmental Project Review
The Interior Building, Room 4256
Washington, DC 20240

Charles A. Dunn, Field Supervisor
U. S. Fish and Wildlife Service
Ecological Services Division
2625 Parkmount Lane, Bldg B-3
Olympia, Washington 98502

Kaylor Martinson, Regional Director
USDOI/Fish and Wildlife Service
Lloyd 500 Building - 1692
500 NE Multnomah Street
Portland, OR 97232

National Marine Fisheries
NOAA
Department of Commerce
P. O. Box 4332
Portland, OR 97208

Leon K. Moraski, District Engineer
Seattle District Corps of Engineers
4735 East Marginal Way South
Seattle, WA 98134

Ry Tanino, Environmental Officer
Community Planning and Development
Department of Housing and Urban Develop.
1321 Second Avenue
Seattle, WA 98101

Office of the Secretary
U. S. Department of Agriculture
Coordinator of Environmental Quality Activities
Washington, DC 20250

Advisory Council on Historic Preservation
Office of Arch and Environmental Preservation
1522 K Street NW, Suite 430
Washington, DC 20005

John D. McDermott, Director
Office of Review and Compliance
Advisory Council on Historic Preservation
P. O. Box 25085
Denver, CO 80225

Ernest E. Sligh, Director
Environmental Impact Division, FEA
New Post Office Building
12 and Pennsylvania Avenue NW
Washington, DC 20461

Donald Samuelson, Regional Representative
Department of Transportation, Region 10
Arcade Plaza Building
1321 Second Avenue
Seattle, WA 98101

Frank S. Lisella, Chief
Environmental Affairs Group
Center for Disease Control
Department of Health and Human Services
Atlanta, Georgia 30333

MEMBERS OF CONGRESS

Honorable Joel Prichard
Congressman, First District
915 Second Avenue
Seattle, WA 98104

Honorable Mike Lowry
Congressman, Seventh District
200 Mill Street
Renton, WA 98055

STATE AGENCIES

Office of the Governor
State Planning Div. and Community
Assistance Division
100 Insurance Building
Olympia, WA 98504

State of Washington
Department of Game
600 North Capitol Way
Olympia, WA 98501
Attn: Bob Ziegler
Habitat Management Division

Donald W. Moos, Director
State of Washington
Department of Ecology
P. O. Box 829
Olympia, WA 98504

Mr. Bob McCormick
Mr. Bob Sylvester
State of Washington
Department of Ecology
4350 - 150 NE
Redmond, WA 98052

Barbara Richey
Environmental Review South
State of Washington
Department of Ecology (PV 11)
Olympia, WA 98504

Rolland A. Schmitten, Director
State of Washington
Department of Fisheries
General Administration Building, Room 115
Olympia, WA 98501
Attention: Mary Lou Mills

State of Washington
Ecological Commission
c/o State of Wash. Department of Ecology
Olympia, WA 98504

Rosemary Walrod, Project Officer
Municipal Division (PV 11)
State of Washington
Department of Ecology
Olympia, WA 98504

Mr. Brian Boyle
Commissioner of Public Lands
State of Washington
Department of Natural Resources
Public Lands-Social Security Building
Olympia, WA 98501

Ms. Jeanne Welch
State of Washington
Historic Preservation Office
111 West 21 Avenue
Olympia, WA 98504

Table 9-1 (cont'd.)

LOCAL GOVERNMENT

John M. Rose, Chairman
Environmental Impact Committee
King Co. Department of Budget and Pro. Deve.
King County Courthouse, Room 400
Seattle, WA 98104

Margaret C. Lane, City Manager
City of Normandy Park
240 SW 200
Normandy Park, WA 98166

Charles Royer, Mayor
City of Seattle
Municipal Building, 12 Floor
Seattle, WA 98104

Harold Robertson
King County Planning Division
King County Courthouse
Seattle, WA 98104

John Nordin
Seattle-King County Health Department
904 Public Safety Building
Seattle, WA 98104

Ralph Colby
King County Bulding and Land Development
431 King County Courthouse
Seattle, WA 98104

Director
Seattle-King County Health Department
Public Safety Building
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Linda Stalzer
King County Community Planning
King County Courthouse
Seattle, WA 98104

Director
King County Parks and King Co.
Administration Building
Seattle, WA 98104

Bruce Jones
Seattle Engineering Department
Municipal Building
Seattle, WA 98104

Jerry Allen
Office of Policy Evaluation
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Diana Gale
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Leroy Jones
King County Office of Ariculture
County Courthouse
Third and James
Seattle, WA 98104

Mary Bundy
King County Growth Management
King County Courthouse
Seattle, WA 98104

Stan McNutt
City Manager
City of DesMoines
21630 - 11 Avenue South
DesMoines, WA 98188

Linda Fitzpatrick, Chairman
Seattle City Planning Commission
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Metro has scheduled a series of public informational meetings on the final plan at the following dates and locations:

Thursday, August 20 - Bothell City Council Chambers
Monday, August 24 - Ober Activity Center, Vashon Island
Tuesday, August 25 - Metro Fourth Floor Conference Room, Seattle
Wednesday, August 26 - Highline High School Cafetorium
Thursday, August 27 - Puget Sound Power and Light Auditorium, Renton
Wednesday, September 2 - Alki Congregational Church

EPA and Metro will hold joint public hearings on the Final EIS and final plan at the following dates and locations:

Tuesday, September 8 - Puget Sound Power and Light Auditorium, Bellevue
Wednesday, September 9 - Alki Congregational Church
Thursday, September 10 - Highline High School Cafetorium

Individuals or groups that wish to comment in writing on the Final EIS may forward written comments to:

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
Attention: Roger Mochnick M/S 443

Comments should be sent by the close of the 30-day comment period on September 14. All verbal and written comments will be considered by EPA in reaching its final decision following the close of the comment period.

Chapter 10

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Charles R. Hazel. B.S., M.S., and PhD., Fisheries Biology. Formerly with California Department of Fish and Game as Director of Water Pollution Control Laboratory. As vice-president of Jones & Stokes Associates, has managed numerous environmental studies and reports and served as expert consultant in fisheries and water quality ecology.

Area of EIS Responsibility. Project management.

Albert Herson. B.A., and M.A., Psychology, M.A. Urban Planning. As staff environmental planner, responsibilities are project management and preparation of planning studies, specializing in land use planning, growth policy, and public service systems. Formerly water quality planner for Southern California Association of Governments. Member, American Institute of Certified Planners (AICP).

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Thomas C. Wegge. B.A., Urban Studies, M.S., Environmental Economics. Environmental economist specializing in socio-economic impacts of land use changes, cost-benefit and risk analysis, and energy impact assessment.

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Douglas P. Albin. A.B., Zoology, M.S., Fisheries. Formerly with California State Water Resources Control Board, where projects included instream flow requirement program. Specialty areas are anadromous fisheries and freshwater ecology of coastal streams.

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Paul Wisheropp. B.S., Environmental Engineering, B.S., Water Resources Management. Environmental engineer specializing in quantitative hydrologic and water quality investigations.

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Jeffrey D. Civian. B.S., Renewable National Resources. Environmental specialist experienced in air quality and noise analyses with emphasis on line source modeling and emission forecast development.

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Roberta M. Mundie. B.A., Social Sciences, Master of City Planning. Held positions with several public planning agencies; 8 years experience in socio-economic impact analysis and forecasting with consulting firm, with emphasis on land use, land development and related issues. Supervises major socio-economic and land use projects for Gruen Gruen + Associates.

Area of EIS Responsibility. Population projections and economic/fiscal impact analysis.

Suzanne Lampert. A.B., Urban Studies, Master of Public Affairs and Urban Planning. Experience with both public agencies and private firms in environmental analysis (especially socio-economic) and general planning. In three years with Gruen Gruen + Associates, has focused on the economic and fiscal impacts of public plans and policies.

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Area of EIS Responsibility. Soils and groundwater impact analysis.

Roger D. Abraham. B.S., Soils and Plant Nutrition, M.S., Soil Science. Experienced soil scientist whose previous projects with HEA include agricultural nonpoint source assessments, soil resource inventory, and feasibility studies of agricultural reuse of municipal wastewater.

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Robert H. Enkoboll. A.B., Geology, M.S., Earth Sciences. Earth scientist whose previous projects include sampling, analyzing, and interpreting channel sands to determine source areas and relative sediment yields in hydrologically-complex watersheds.

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Barry Hecht. A.B., Geology, Geography/Planning, M.A., Geography. Responsible for a wide range of geologic and hydrologic investigations. Previous projects include a variety of sediment transport studies, analysis of nonpoint source groundwater pollution controls, and assessments of groundwater impacts of land application of effluent and sludge.

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Hall and Associates, Seattle, WA

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Area of EIS Responsibility. Review of fisheries impact analysis.

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Steve Fleming. Extensive experience preparing maps, charts, and illustrations for technical reports and documents. Additional experience preparing cartoons and illustrations for various reports and publications.

Area of EIS Responsibility. Report graphics.

Chapter 11

BIBLIOGRAPHY

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__________. 1978c. East Sammamish proposed communities plan.

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__________. 1979c. King County housing market study.

__________. 1979d. Final environmental impact statement, Soos Creek communities plan.

__________. 1979e. Newcastle community plan profile.

__________. 1979f. The Black River Marsh: the East Side Green River water project.

__________. 1979g. A river of Green.

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__________. 1980b. Tahoma/Raven Heights communities plan profile.

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Chapter 12

WRITTEN COMMENTS RECEIVED ON DRAFT EIS AND RESPONSES TO COMMENTS

Introduction

The public comment period on the Draft EIS lasted from December 19, 1980 to February 17, 1981; written comments were accepted by EPA for several days after the February 17, 1981 closing date. During the review period, EPA received written comments on the EIS from five federal agencies, five state agencies, nine regional or local agencies, seven organizations, and 39 citizens. Some of the agencies responded twice or more in writing, and some of the citizen letters were signed by more than one citizen. Included in these totals are letters addressed to Metro, and carbon-copied to EPA. EPA also received petitions with about 2,000 signatures from residents of the Burien, Highline, and Vashon Island areas, opposing an outfall in the Three Tree Point area.

The issues raised in these letters can be classified into several broad groups: water quality issues, wastewater management planning issues, sensitive areas issues, construction and neighborhood impacts issues, cost issues, and EPA decision-making issues. General answers to the most frequently raised comments are presented in the FOREWORD to this EIS.

This chapter presents all written comments received by EPA on the Draft EIS, and responses to each comment letter. For each comment, the letter is first presented, with numbers in the margin indicating the specific statements responded to; responses to each of the statements are then grouped following each letter.

FEDERAL AGENCIES

United States
Department of
Agriculture

Soil
Conservation
Service

Room 360 U.S. Courthouse
Spokane, Washington 99201

December 31, 1980

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

We have reviewed your draft environmental impact statement for Wastewater Management Plan for the Lake Washington/Green River Basins. It would appear the concerns of the Soil Conservation Service are met, and we have no comments to offer at this time. ①

Sincerely,

Gene Andreuccetti

LYNN A. BROWN
State Conservationist acting

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The Soil Conservation Service
is an agency of the
Department of Agriculture

SCS-AS-1
10-79

Response to SCS Letter of December 31, 1980

1. No response required.

Advisory Council On Historic Preservation

1522 K Street, NW
Washington, DC 20005

Reply to:

Lake Plaza South, Suite 616
44 Union Boulevard
Lakewood, CO 80228

January 14, 1981

RECEIVED
JAN 19 1981
ENVIRONMENTAL EVALUATION BRANCH

Mr. Roger K. Mochnick M/S 443
Environmental Evaluation Branch
Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

Thank you for your request of December 2, 1980, for comments on the draft environmental statement for the wastewater treatment plan for the Lake Washington and Green River Basins in Washington. Pursuant to Section 102(2)(c) of the National Environmental Policy Act of 1969 and the Council's regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800), we have determined that your draft environmental statement does not contain sufficient information concerning historic and cultural properties for review purposes. Please furnish the following data indicating compliance with Section 106 of the National Historic Preservation Act of 1969 (16 U.S.C. Sec. 470f, as amended, 90 Stat. 1320). The environmental statement must demonstrate that either of the following conditions exist:

1. No properties included in, that may be eligible for inclusion in, or that have been determined on the authority of the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places are located within the area of environmental impact, and the underaking will not affect any such property. In making this determination, the Council requires:

   - evidence that you have consulted the latest edition of the National Register (Federal Register, March 18, 1980, and its monthly supplements); ①

   - evidence of an effort to ensure the identification of properties eligible for inclusion in the National Register, including evidence of contact with the State Historic Preservation Officer, whose comments should be included in the final environmental statement. The State Historic Preservation Officer for Washington is Mr. Louis Guzzo. ②

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2. Properties included in, that may be eligible for inclusion in, or that have been determined on the authority of the Secretary of the Interior to be eligible for inclusion in the National Register of Historic Places are located within the area of environmental impact, and the undertaking will or will not affect any such property. In cases where there will be an effect, the final environmental impact statement should contain evidence of compliance with Section 106 of the National Historic Preservation Act through the Council's regulations.

If you have any questions, please call Marjorie Ingle at (303) 234-4946, an FTS number.

Sincerely,

B.A. Storey

Acting Louis S. Wall
Chief, Western Divison
of Project Review

Response to ACHP Letter of January 14, 1981

1. The latest edition of the National Register of Historic Places has been consulted, and the list includes a number of National Register sites within the study area. However, none is near the Renton treatment plant or the tunnel/outfall route to Puget Sound.

2. The State Historic Preservation Officer (SHPO) has been consulted, and in a January 7, 1981 letter to EPA (presented later in this chapter), the SHPO indicates concurrence with measures to identify cultural resources and mitigate anticipated impacts described in the EIS.

3. EPA has determined that none of the National Register sites within the study area will be directly affected by the proposed project. None of the facilities proposed under the final plan recommended program (improvements at the Renton treatment plant site, tunnel/outfall to Puget Sound) involves construction near a National Register site.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
Atlanta, Georgia 30333
404-262-6649

January [illegible] 1981

Mr. Roger K. Mochnick
Environmental Evaluation Branch, M/S 443
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

We have reviewed the Draft Environmental Impact Statement (EIS) for the Wastewater Management Plan for the Lake Washington/Green River Basins. We are responding on behalf of the U.S. Public Health Service and are offering the following comments for your consideration in preparing the final document.

In general, we have no major objections to the preferred action concerning collection system changes, Renton treatment plant expansion, solids handling facilities, and a tunnel and outfall to Puget Sound.

According to the EIS, the Renton treatment plant lies next to the Green/Duwamish River. Fill is required to raise elevations on the undeveloped part of the plant site from 16 feet to between 26 and 34 feet. While it is indicated that the plant site will receive adequate protection from floods, please explain if the fill is to be placed within a 100-year flood plain and whether 100-year flood levels will be altered upstream of the treatment site. ①

We have some concerns regarding the Redmond Connection Emergency Bypass. We understand that this bypass is designed to operate in the event of a failure at the Totem Lake pumping station. The probability of an emergency bypass occurring should be better described. The potential health hazards from any discharge of untreated sewage into the Sammamish River should also be addressed. In particular, the potential impact upon water quality and food fish resources in Sammamish River and its receiving waters should be discussed. ②

With regard to the first and second "grant conditions for secondary impacts" (page 227), the local importance of agricultural, flood plain, or wetland areas has not been acknowledged. An analysis by local agencies of the impacts upon these areas and of practicable alternatives may not necessarily be protective by itself. How do local regulations or laws for protection of these areas compare to Executive Orders 11988 and 11990 on flood plain and wetlands protection and Federal policies on agricultural lands? ③

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Page 2 - Mr. Roger K. Mochnick

We appreciate the opportunity to review this Draft EIS. Please send us one copy of the final document when it becomes available. Should you have any questions about our comments, please contact Mr. Robert Kay of my staff at (404) 262-6649.

Sincerely yours,

Frank S. Lisella, Ph.D.
Chief, Environmental Affairs Group
Environmental Health Services Division
Center for Environmental Health

Response to DHHS Letter of January 28, 1981

1. The Federal Emergency Management Agency (FEMA) is currently remapping the Green River floodplain in response to new regulations; it is not known whether the Renton treatment plant site will be shown as being within the 100-year floodplain on the new map. The required filling of the treatment plant site should have no major effect on 100-year flood levels upstream of the site.

2. The pipelines and pump stations called for in the Redmond and Hollywood/North Creek connections would be capable of handling peak flows under normal operating conditions. Pump stations are designed with redundant units so that routine maintenance and repair can take place without interruption in service. An interruption in service could occur in the event of a power outage. Because this is a possibility, provisions are made for reserve power generation capacity at pump stations to keep them in operation. This may be in the form of diesel powered generation facilities located at the pump station site or portable units. Metro currently utilizes both of these types of systems in its existing pump stations. With these backup systems the possiblity of an emergency overflow is extremely unlikely. The impacts of such an event have been described in more detail in Chapter 6 of the EIS.

3. See General Response Number 6. Metro and local government programs described in Chapter 7 of the EIS have recognized the importance of agricultural lands, wetlands, and floodplains. Requiring further analysis to be performed for interceptor sewers connecting to the Renton plant does not guarantee the protection of agricultural lands and sensitive areas from development, but would encourage careful analysis of impacts, alternatives and mitigation measures prior to decision-making; this is the emphasis of federal policies for these areas.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane, S.W., Bldg. B-3
Olympia, Washington 98502

February 17, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

We have reviewed the draft environmental impact statement concerning the Wastewater Management Plan for the Lake Washington/Green River Basins dated December 1980. Based on our review of the above document, we support the concept of alternative A-5, which would provide centralized processing at the Renton plant with a discharge of secondary effluent to Puget Sound off Alki Point. While we believe this alternative is the best in solving future adverse water quality impacts in the Green/Duwamish River, our agency is extremely concerned about potential impacts to riverine habitat and losses of wetlands, floodplains, and agricultural lands associated with the construction of the components of the collection system and tunnel/outfall.

It was noted in our review of the EIS document that there were major impacts to fish and wildlife resources with the various components of the preferred alternative. These are summarized below:

1. Redmond Connection (pages 91-95)

   The 12,500-foot-long alignment would impact agricultural lands. ". . . portions of the alignment will be within the seismic and erosion hazard areas within the 100-year floodplain of the Sammamish River. Furthermore, construction will be necessary within the riverbed of the Sammamish River at one point."

2. North Creek/Hollywood Connection (page 95)

   "Much of the proposed North Creek/Hollywood connection will traverse agricultural land from Woodinville south to the existing Hollywood pumping station at N.E. 124th Street . . . The alignment would pass through areas considered sensitive by King County. Most of the alignment from Bothell south to N.E. 124th Street would be within a Class III seismic hazard area and the 100-year floodplain of the Sammamish River and Bear Creek. The alignment would require one stream crossing (Bear Creek) and construction through several wetlands just sound (sic) of Woodinville."

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3. Alternative Route E (East Duwamish) - Effluent Discharge Route for Alki Point (pages 107-108)

   The river crossing of this alternative would be near Kellogg Island. It should be noted that Kellogg Island is the last tract of undeveloped wildlife habitat located in a highly industrialized area. The area is used by a variety of migratory birds. The island has also been recently listed in a U.S. Fish and Wildlife Service publication entitled "Important Fish and Wildlife Habitats of Washington". We recommend that an alternate location of a river crossing be found in order to prevent disruption of this significant habitat.

4. Impacts of Redmond Connection Emergency Bypass (pages 127-129)

   "One feature of the Redmond connection, proposed as part of the preferred program, could adversely affect water quality. This is an emergency bypass from the York pump station discharging to the Sammamish River. The emergency bypass would be designed to operate in the event of failure at the Totem Lake pumping station, which is considered by Metro to be an event of remote probability. Sewage would be bypassed to the Sammamish River in such an event . . . A substantial inflow of sewage could cause mortality to invertebrate and fish populations downstream of the Hollywood pump station."

We believe these four issues identified above should be studied in greater detail. Due to the impacts to wetlands, floodplains, and agricultural land, more alternative routes should be explored for the Redmond connection, North Creek/Hollywood connection, and the effluent discharge route for Alki Point. The development of a full array of alternative routes is necessary if your agency is going to fully comply with Executive Order 11990, Protection of Wetlands, and Executive Order 11998, Floodplain Management. ① In addition, an emergency generation source should be found for the Totem Lake pumping station in order to prevent a major fish kill in the Sammamish River. ②

We also want to call your attention to Washington Department of Game's letter dated February 3, 1981 (copy attached), which provided comments relative to this proposed project. We agree with their comments made under item 10, State Environmental Policy Act, page 5. In light of these comments, we recommend that if EPA funds are used in the design and/or construction of wastewater facilities for the Lake Washington/Green River Basins, then Metro be required to conduct detailed assessments of impacts to sensitive areas (riverine habitat and wetlands, floodplains, and agricultural lands) in future SEPA EIS's for interceptor sewers connecting to the Renton plant. These EIS's should focus on location of specific impacts, alternative plans, and mitigation measures. ③

We appreciate the opportunity to review this document. If you have any additional questions, please contact Martin Kenney, of my staff, at 753-9440.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

Attachment

cc: WDG
WDF
WDE
BIA
NMFS
Muckleshoot Indian Tribe

Response to USFWS Letter of February 7, 1981

1. See General Response Number 6.

2. See General Response Number 2 to Department of Human and Health Services letter.

3. EPA intends to require such assessments as a grant condition for the Metro plan.

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Ecological Services
2625 Parkmont Lane, S.W., Bldg. B-3
Olympia, Washington 98502

March 2, 1981

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MAR 3 1981
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Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

In a letter dated February 17, 1981, our agency commented on the draft environmental impact statement concerning the Wastewater Management Plan for the Lake Washington/Green River Basins. Since the submittal of our comments, we have reviewed the implications of the preferred alternative in greater detail. This review was facilitated by a February 18, 1981, meeting held to review water quality studies of the Duwamish River as related to the U.S. Army Corps of Engineers' proposed deepening and widening navigation project. At this meeting, it was pointed out that the Renton Treatment Plant contributes 25 percent of the flow in the Duwamish River during the low-flow months of August and September. We understand that the percentage during the low-flow months would be substantially higher by the year 2000.

While our agency continues to support the concept of alternative A-5, we believe the final EIS should address the following issues:

①

1. What is the effect of removing the Renton Treatment Plant discharge from the Green-Duwamish River? We are particularly concerned about reduced flows and what impacts they could have on salmonids during the following periods:
   a. Upstream migration of adults.
   b. Outmigration of juveniles.
   c. Low-flow months.
2. Does your agency and Metro believe the flows established by the Department of Ecology (DOE) under their June 1980 Green-Duwamish River Basin Instream Resources Protection Program can be met under the preferred alternative?
3. If DOE's minimum instream flows cannot be met, what does this flow reduction mean in terms of salmonid spawning and rearing, and adult, juvenile, and fry habitat? If anticipated flows under the preferred alternative are projected to be different than DOE's established minimum instream flows, then we believe the project should quantify fish habitat at various life stages under different flow regimes. One methodology which evaluates fish habitat at various flow regimes is the Service's incremental flow methodology, which is described in the Service's publication entitled, "Hydraulic Simulation in Instream Flow Studies: Theory and Techniques".

In summary, these comments are to supplement our original comments made on February 17. We believe these additional comments raise important concerns relative to fish and wildlife which must be addressed in the final EIS. In addition, we request that these comments be included in the final EIS.

If you have any questions, please contact Martin Kenney, of my staff, at (FTS) 434-9440 or commercial 753-9440.

Sincerely,

Charles A. Dunn

Charles A. Dunn
Field Supervisor

cc: EPA (Partridge)
WDG
WDF
WDE
BIA
NMFS, Seattle
Muckleshoot Indian Tribe

Response to U. S. Fish and Wildlife Service Letter of March 2, 1981

1. See General Response Number 1 to the following letter from the U. S. Army Corps of Engineers. Since DOE minimum flows are for 300 cfs measured at Auburn, and since the Renton treatment plant discharges to the Duwamish below Auburn, the discharge does not affect achievement of minimum flows at Auburn. DOE did not include the Renton discharge in the 300 cfs guideline. If the 300 cfs minimum flow is not met at certain times, and the Renton discharge is diverted from the Duwamish River, that discharge would not be available to compensate for the shortfall below 300 cfs downstream from the treatment plant.

DEPARTMENT OF THE ARMY
SEATTLE DISTRICT, CORPS OF ENGINEERS
P.O. BOX C-3755
SEATTLE, WASHINGTON 98124

NPSEN-PL-ER

27 FEB 1981

Roger K. Mochnick
Environmental Evaluation Branch
U.S. Environmental Protection
  Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

We have reviewed the draft environmental impact statement on the Wastewater Management Plan for Lake Washington/Green River Basins, Washington, with respect to the U.S. Army Corps of Engineers' areas of responsibility for flood control, navigation, and regulatory functions. Our comments are attached as inclosure 1.

Thank you for the opportunity to review this statement. If you have any questions, please contact Dr. Steven F. Dice of my staff, at telephone (206) 764-3624.

Sincerely,

LEON K. MORASKI
Colonel, Corps of Engineers
District Engineer

1 Incl
As stated

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NPSEN-PL-ER

13 February 1981

COMMENTS: Draft Environmental Impact Statement (DEIS), Wastewater Management Plan for the Lake Washington/Green River Basin

1. Throughout the DEIS, reference is made to Washington Department of Ecology (1980) minimum flow rules which call for summer flows of 300 cubic feet per second (c.f.s.). As clarified at a 4 February 1981 meeting attended by the Corps of Engineers, Metro, and EPA, this figure may be inappropriate as a planning or impact assessment criteria. DOE minimum flow constraints are designed to preclude new diversion which would cause flow at Auburn to fall below 300 c.f.s. However, flow presently falls below 300 c.f.s. in most years. In the future, flows will probably continue to fall below 300 c.f.s. because DOE minimum flow constraints will not affect previously existing diversions. Existing conservation storage in Howard A. Hanson reservoir is insufficient to increase flow supplements to assure 300 c.f.s. at Auburn. ①

2. The DEIS does not address potential interactions with the Seattle District's navigation and flood control studies for the Green-Duwamish system. Particular attention should be paid to cumulative and secondary effects on water quality, fisheries, and land use (especially future growth). Primary effects are generally well dealt with; however, it appears that the secondary and tertiary effects of Metro's proposal, in concert with the actions of other agencies and local governments, may be of more significance than the immediate effects. ②

3. The Seattle District has recently completed a water quality study in the Duwamish estuary that considers the possibility of removing Renton sewage treatment plant effluent from the river. A copy of this report has been sent to Ms. Lloyd Eagan of Metro's staff. ③

4. Because of the potential for future water quality problems in the Duwamish River Estuary as a result of diversion of treated waters to Puget Sound, we suggest that consideration be given to modifying the selected alternative as described in the following paragraphs.

Presently, the Renton Sewage Treatment Plant diverts treated waters to the Green/Duwamish Rivers at a peak rate exceeding 40 million gallons daily. During low flow periods, these discharges provide a benefit by increasing total volume and velocities in the river. This procedure minimizes the potential for water quality problems associated with lower flows (agal blooms, dissolved oxygen decreases, etc.) and attendant potential impacts to fisheries resources. (4a) As there is little likelihood that low flows within the basin can be substantially increased on a sustained basis by a change in operation of Howard A. Hanson Dam, we suggest that consideration be given to retention of some capacity for "advanced secondary" treatment with nitrification at the expanded Renton Plant. During low-flow periods or during "drought" years, these treated waters could be directed to the Green-Duwamish system, as needed, (4b)

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through the existing outfall. During other periods of the year, secondary treated waters would be mixed with lesser treated waters and piped to Alki or Point Pulley for final treatment and discharge to Puget Sound.

Although we realize additional costs may have to be absorbed for systems modifications at the plant site and for operation and maintenance of a dual pipe system to at least the Green/Duwamish outfall, further analysis may show this modification to be cost effective when considering the potential danger to fisheries resources because of inadequate flows to abate water quality problems.

5. Page 7, paragraph titled "Clean Water Act." This section should also refer to Section 404 of the Clean Water Act. Section 404 discusses Department of the Army permit requirements concerning the discharge of dredged or fill materials into waters of the United States and on adjacent wetlands. ⑤

Page 11, paragraph titled "Corps of Engineers." This section should also refer to Corps of Engineers responsibility to issue permits under Section 10 of the River and Harbor Act of March 3, 1899 for the performance of any work in navigable waters of the United States. ⑥

6. Page 29 and table 2-4 on page 30. The latest population data shown is for 1970 which is now out of date. State population data is available for 1980 and should be used. ⑦

7. Page 144, table 5-4, item 8 under "Additional Measures Available" credits interim river flow augmentation with high potential for reduction of the current ammonia load. However, the storage available in Howard A. Hanson Dam is committed to the maintaining of a discharge for fishery and no additional water is available for increased augmentation. This could be significant since Metro reports that few of the measures in and of themselves solve the problem of ammonia, but that combinations can adequately protect the river's fishery resource through the construction period. ⑧

Response to U. S. Army Corps of Engineers Letter of February 13, 1981

1. The EIS states in Chapter 6 that actual flows fall below 300 cfs. In the analysis of effects of increased Tacoma diversions, the EIS acknowledges that DOE minimum flows apply to future, not existing, diversions.

2. Analyses of proposed Corps dredging, the SCS drainage project, and increased Tacoma diversions were added to Chapter 6 of the Final EIS. The Final EIS contains an extensive analysis (Chapter 7) of the secondary impacts of the project.

3. The results of the study have been integrated into the Final EIS.

4a. See General Response Number 3.

4b. A seasonal nitrification alternative was considered by Metro, but was rejected because of the extreme operational difficulties of turning on and off the complex biological processes involved in nitrification.

5. This correction has been made in the Final EIS.

6. This correction has been made in the Final EIS.

7. The 1980 census data would increase the study area 1980 population by about 32,000. This is not considered to be a significant enough difference to vary the capacity planned for at the Renton plant.

8. Comment noted. Metro has consulted with Washington State Department of Fisheries regarding timing of the fishery maintenance flow from the reservoir.

STATE AGENCIES

STATE OF WASHINGTON
Dixy Lee Ray
Governor

OFFICE OF ARCHAEOLOGY AND HISTORIC PRESERVATION
111 West Twenty-First Avenue, M.S. KL-11, Olympia, Washington 98504 206/753-4011

January 7, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

In reply refer to: 186-F-EPA-01

Re: Wastewater Management Plan for the Lake Washington/Green River Basins

Dear Mr. Mochnick:

A staff review has been completed of your draft environmental impact statement. The project was discussed previously by this office with Mr. Craig Partridge of your staff. We concur with measures proposed to identify cultural resources and mitigate anticipated impacts to such resources as may be present. ①

Thank you for this opportunity to comment.

Sincerely,

JEANNE M. WELCH, Deputy State
Historic Preservation Officer

Sheila A. Stump, Archaeologist

db

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EPA-EIS

Response to SHPO Letter of January 7, 1981

1. No response required.

STATE OF
WASHINGTON

DEPARTMENT OF TRANSPORTATION
Highway Administration Building, Olympia, Washington 98504 [illegible]

January 27, 1981

Mr. Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

U.S. Environmental Protection Agency
Wastewater Management Plan
Lake Washington/Green River Basins
Draft Environmental Impact Statement

Dear Mr. Mochnick:

We have reviewed the subject document and have no comments to offer regarding the proposal. ①

Thank you for the opportunity to review this information.

Sincerely,

ROBERT S. NIELSEN
Assistant Secretary for Public
Transportation and Planning

Joseph Bell

By: JOSEPH BELL, Manager
Planning Implementation and
Environmental Policy

RSN:kls
JB/WBH

cc: J. D. Zirkle/T. R. Burke

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Response to DOT Letter of January 27, 1981

1. No response required.

STATE OF
WASHINGTON
XXXXXXXXX
XXXXXXXXX
John Spellman
Governor

DEPARTMENT OF GAME
600 North Capitol Way, GJ 11 Olympia, WA 98504 206/753 5700

February 3, 1981

Mr. Robert K. Mochnick, MS/443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

DRAFT ENVIRONMENTAL IMPACT STATEMENT:

Management Plan for the Lake Washington/Green
River Basins, King County

Mr. Mochnick:

Your document was reviewed by our staff as requested; our comments follow.

Your document does show an understanding of impacts from projects similar to your sewering plan, but many of the statements are confusing and appear to contradict, so it is not clear what the impacts would be on the public's fish and wildlife resources from this project. Our questions follow.

1. We wonder if your preferred plan would meet Federal Consistency Requirements under the Coastal Zone Management Act. The Coastal Zone includes all the territory in King and Snohomish counties. Not only would your project have a direct impact on marine waters, but secondary impacts (urbanization) would reduce marine aquatic resources such as salmon, steelhead, and other anadromous fishes. ①

It would appear that your preferred alternative of a centralized system would conflict with Puget Sound Council of Government's King Subregional Plan when secondary impacts are analyzed. This plan encourages future development within King County to utilize previously committed land areas and existing facility systems before expanding with new areas. One purpose of the plan is to direct growth to existing urban hubs. A centralized sewer system would appear to conflict with this plan. ②

From your statement, it would appear that the preferred system would also conflict with local ordinances to protect farmlands, wetlands and other sensitive areas. ③

On page 95 you state: "Much of the proposed North Creek/Hollywood connection will traverse agricultural land from Woodinville south to the existing Hollywood pumping station at N.E. 124th Street. ...The alignment would require one stream crossing (Bear Creek) and construction through several wetlands just sound(sic) of Woodinville." You also state the proposed line would traverse land within the Sammamish Valley/Bear Creek Agricultural District and would parallel the Sammamish River Parkway.

However, King County Ordinance 3064 defines agricultural lands of county significance as: " 3) Lands where urban level water or sewer lines are not in place" Page 192.

On page 196 and 204 you state King County Sewerage General Plan excludes sewers from designated farmlands of county significance and wetlands and floodplains. ④

One purpose of King County Sensitive Areas Ordinance is to direct growth away from wetlands, streams, steep slopes, and earthquake hazards. Again a potential conflict exists. ⑤

We wonder if your proposal meets your agency's guidelines. Is this proposal the least impact alternative? When considering the secondary impacts does the preferred alternative meet your wetland guidelines? Your Policy Statement on Protection of Nation's Wetlands reads: "In compliance with the National Environmental Policy Act of 1969, it shall be the policy of this agency not to grant Federal funds for the construction of municipal waste water treatment facilities or other waste-treatment-associated appurtenances which may interfere with the existing wetland ecosystem except where no other alternative of lesser environmental damage is found to be feasible." (38 FR 10834, March 20, 1973) ⑥

On page 190 you state: "EPA in 1978 established an agency-wide policy to assure that its actions, regulations, and programs reinforce the retention of environmentally significant agricultural land."

On page XXV you state: "EPA programs and policies require that these impacts be mitigated where possible." However, you have decided that in this case "neither EPA nor METRO is institutionally responsible" for the growth and secondary impacts. Throughout the document you list mitigation measures that are "not your responsibility" and that could be done. However, in actuality it is highly unlikely they would ever be accomplished. For example, you state METRO could prepare EISs for interceptors effecting farmlands (198), and all cities could adopt policies to protect farmlands and wetlands (198,204). ⑦

On the other hand in discussing decentralized alternatives on page 156 you state: "In theory, acquisition of land treatment sites could support King County open space policies... A total of 1,164 acres (almost 2 square miles) would be needed for land treatment, and this land would be assured of long-term use as agricultural open space."

"For some of the decentralized communities, construction of decentralized facilities could lessen development pressures in interceptor sewer corridors (page 156)." ⑧

2. Consultation (page 7)

In discussing the Fish and Wildlife Coordination Act, you state that EPA procedures for implementing NEPA require consultation with Fish and Wildlife Service and appropriate state wildlife agencies to develop mitigation measures for adverse impacts. Has this consultation taken place? ⑨

3. Biochemical Oxygen Demand (B.O.D.) and Suspended Solids (S.S.)

On page 39 you state: "For the first quarter of 1980, the B.O.D. loading was 3,700 pounds per day, and the S.S. loading was 3,200 pounds per day." Is this an average? What was the maximum B.O.D. load in a five day period? ⑩

4. In-River Actions (page 61)

You state that alternatives of increased discharges from Howard Hanson Dam and bank shading were considered by METRO to either be unrealistic or ineffective as a long-term solution. However, until water quality problems in the Duwamish are solved, these alternatives may be necessary if tribal, commercial, and sports fisheries are to be retained and restored. ⑪

5. Seismic Hazard

What is the earthquake potential for the alternative line crossings of the Duwamish? Would crossings occur in areas and soils likely to withstand earthquake damage? ⑫

6. Impacts of Water Quality Violations (138-143)

On page 138 you conclude that, although water quality standards have been violated, "no obvious effects on fish or biota in the lower Green/Duwamish River directly attributable to the Renton discharge have been recorded at effluent discharge levels to date". This statement is repeated on page 143.

On page 141 you state: "As previously discussed, the Richmond Beach outfall is unlikely to create measurable adverse water quality impacts in Puget Sound. Therefore, no corresponding biological impacts in Puget Sound are expected." ⑬

Yet on page 140 you state: "High incidences of fin erosion and liver tumors have been found in starry flounder and English sole in the Duwamish estuary... Fin erosion diseases have been associated with areas of heavy wastewater discharge in the ocean off southern California, and in the New York Bight:

On page 139 you state: "However, the heavy metals in Renton effluent would be lower than in the West Point effluent because there are fewer industrial sources in the Renton service area, and because the Renton plant has a higher degree of treament." We wonder if this can expect to continue, especially with the industrial expansion occurring in the Green River Valley. ⑭

8. Economic Loss with Resource Loss

On page 179 you discuss the economic value of salmon. We point out that game fish also have an economic value with a return largely to small communities. Many small communities provide food, gear and lodging to the angling public. The fishery is essential to the economic survival of these small towns. ⑮

You conclude: "Therefore, one way to analyze the impacts of future growth on fishing resources is to simply look at the increase in urban acres within sub-drainage basins." (179) If a secondary impact of your proposal would be an increase of urbanization, we wonder if your proposal would comply with the recent Indian Treaty Fishing Right decision by U. S. District Judge William H. Orrick. That decision reads: "That is the minimal need which gives rise to an implied right to environmental protection of the fish habitat. Therefore, the correlative duty imposed upon the State (as well as the United States and third parties) is to refrain from degrading the fish habitat to an extent that would deprive the tribes of their moderate living needs." ⑯
(Page 31 of Civil No. 9213 - PHASE II Opinion)

9. Terrestrial Wildlife

You conclude: "Given the regional nature of the growth projections examined in this EIS, it is not reasonable to further assess the impacts of urbanization on terrestrial wildlife and ecosystems, largely because these differ with different urban land uses." However, mention should be made of two important resources that would be greatly reduced if farmland and wetlands in the study area are converted to urban uses. Waterfowl depend on these areas for food and rest as they migrate on the Pacific flyway. Non-game species such as raptors, heron, small mammals, and songbirds would also decline. The Green River Valley currently supports gyrfalcon, red-tailed hawk, marsh hawk, peregrine falcon, Cooper's hawk, and kestrel. ⑰

Important heron rookery and feeding grounds are found in Auburn. Other species of special concern are provided in your appendix. (NOTE: We did not receive a copy of your appendix.)

Loss of vegetation near streams will eliminate wildlife migration routes, breeding, and rearing areas for many species.

10. State Environmental Policy Act

In discussing your summary of mitigation measures for sensitive areas you state: "In addition to those already mentioned, an important mitigation measure is the SEPA's requirement for preparation of EISs when individual development projects could have a significant effect on the environment." (206) While SEPA does provide for some amount of public disclosure, determinations of significance or non-significance are made by the public agency initiating an action or permitting an activity. For example, if the City of Auburn decides that filling of wetlands and removal of farmlands are not significant, an environmental impact statement is not prepared. Due to the fact that many public agencies have neither expertise to evaluate significant impacts nor enough staff to prepare EISs, most projects go through the SEPA process as Declarations of Non-Significance. ⑱

It is essential that Renton plant discharges no longer be loaded to the Duwamish. Water quality is already violated and flatfish show signs of contamination. Proposed river widening and deepening and associated development would further accelerate water quality problems. With a wider and deeper channel, the salt water wedge would be increased. This, combined with additional contamination from stormwater runoff, would take large toll on the fishery resource.

However, we recommend an integrated wastewater program that will transfer wastewater discharges from the Duwamish to the Sound, but will incorporate decentralized systems in outlying areas. Your program should support rather than challenge the protection of farmlands, wetlands, floodplains, as well as existing and potential fish and wildlife populations. ⑲

Thank you for sending your document. We hope you find our comments helpful.

Sincerely,

THE DEPARTMENT OF GAME

Bob Zeigler
Bob Zeigler, Applied Ecologist
Environmental Affairs
Habitat Management Division

BZ:mjf

cc: Agencies
Region
Washington Environmental Council
National Marine Fisheries Service, Portland

Attachment

Response to Department of Game Letter of February 3, 1981

1. EPA has examined the Shoreline Master Plans for King County and the City of Seattle, which are the main shorelines which could potentially by affected by the proposed project, and has determined that the proposed project is consistent with these plans. These plans encourage protection of water quality, and such protection is afforded by diversion of Renton effluent to Puget Sound, where it can be more effectively diluted and dispersed, as compared to the present discharge to the Green/Duwamish River.

King County administers the shoreline permit program for the Seahurst Park area and would be responsible for issuing needed shoreline development permits. The King County shoreline management plan classifies Seahurst Park as a "conservancy" area. Under this classification, utility uses may be allowed subject to conditions. EPA has determined, in consultation with King County shoreline management staff, that the proposed tunnel outlet, pump station, and marine outfall would be considered a utility use. EPA has therefore determined that the proposed decision will be consistent with the state coastal zone program. Metro will be required to obtain a shoreline permit from King County.

Regarding secondary impacts, these have been noted in the EIS and mitigation measures have been described, one of which is implementation of plans such as the Shoreline Management Plan to reduce the adverse environmental consequences of urban growth.

2. A centralized sewerage system does not necessarily conflict with the King Subregional Plan, provided that sewers are extended only to close-in areas. In the case of the Metro plan, the proposed service area is based directly on the King County Sewerage General Plan. The policies underlying the Sewerage General Plan, which encourage servicing only those areas within and immediately adjacent to urban development, are consistent with the policies of the King Subregional Plan.

3. See General Response Number 6.

4 and 5. Should the North Creek/Hollywood Connection be implemented, its intended function would be as a transfer sewer, not as a collector sewer, for the lands through which it passes, and it would thus not function to provide service

to agricultural lands or sensitive areas in the Sammamish Valley. Further protection to these areas is provided by Metro Resolution 3380, prohibiting the sewering of designated agricultural lands and wetlands in unincorporated areas.

6. See General Response Number 6. Also, because the Redmond and North Creek/Hollywood connections are not part of Metro's recommended plan, potential adverse impacts on wetlands from construction of these facilities would be avoided. If the decision is subsequently made to construct these facilities, Metro would seek an additional construction grant, and EPA would develop appropriate mitigation measures as grant conditions for site-specific wetlands impacts.

Aside from direct impacts of the sewerage facilities on wetlands, the EIS described secondary impacts of growth accommodated by the wastewater plan on wetlands. These impacts would occur regardless of which of the long-term wastewater management alternatives is selected since each alternative assumes a common growth forecast. Only the no-project alternative could partially reduce potential adverse impacts on wetlands, but EPA does not consider this alternative to be environmentally preferable because adverse impacts on water quality of the Green/Duwamish River would result.

7. EPA, in accordance with NEPA regulations, has listed mitigation measures for secondary impacts which are outside its ability to implement, as well as mitigation measures which could be enforced by EPA or Metro. Some of the measures identified for agencies other than Metro or EPA may not be politically feasible, but according to recent Council on Environmental Quality guidance (Federal Register, March 23, 1981, p. 18028), all relevant, reasonable mitigation measures should be included in federal EISs.

8. The intent of the commenter in citing these EIS sections regarding decentralized systems is unclear. The Draft EIS did point out certain land use and open space advantages to decentralized systems, and these advantages have been fully considered in the Metro and EPA decision-making processes.

9. Appropriate coordination with fish and wildlife agencies has occurred during preparation of the EIS. The U. S. Fish and Wildlife Service was contacted by EPA early in the EIS process regarding threatened and endangered species and other concerns. The EIS consultant has received considerable input from the Department of Fisheries and the Department of Game Natural Heritage Data System. As design details and facility alignments are resolved in the near future, Metro and these state agencies should be in consultation for mitigation of construction impacts.

10. On page 42 of the DEIS, the range (minimum and maximum) of effluent BOD_5 values is displayed for the period January 1979 through March 1980. The maximum daily BOD_5 for that period was 35,000 lbs/day. Mr. Fred Holem is the Department of Game representative on Metro's Water Quality Monitoring Review Board and routinely receives monthly effluent quality reports for the Renton treatment plant.

11. The RIBCO studies analyzed the temperature and DO benefits associated with tree shading and low flow augmentation. Based on the RIBCO analysis, tree shading could significantly improve temperature and DO. However, RIBCO recommended that low flow augmentation be implemented. Because it would be 30 years before shading from trees would be effective, RIBCO concluded that planting shade trees was less practical and could not be recommended without additional study. The Corps of Engineers has stated that presently low flow augmentation from operation of Howard Hanson Dam is only available through coordination with Washington State Department of Fisheries and then only to a limited extent. However, the Corps is considering restudying dam operation to increase flow augmentation capacity.

12. See General Response Number 7.

13. There is no logical inconsistency among the three statements referred to. No major biological impacts on Green/Duwamish River biota from Renton effluent have been reported to date, and no major biological impacts of a Kenmore or Renton discharge to Puget Sound are predicted based on existing local data. It is true that certain biological impacts have been reported in areas of heavy wastewater discharge in southern California and New York, but these reports reflect local conditions, and it would be scientifically invalid to directly extrapolate these results to Puget Sound or the Green/Duwamish River.

14. It is difficult to say whether or not to what extent an increase in heavy metals might be expected in the RTP effluent due to further industrialization. Land use planning agencies are unable to accurately forecast the type, location, and amount of new industrial development. For purposes of the Renton study, industrial flows were projected to increase in proportion to the growth in residential/commercial flows. Although industrial flows projected for the RTP will increase, the total volume of industrial flow will still be less than the volume tributary to West Point. Other factors to consider include the effect of Metro's industrial pretreatment program and industrial discharge permit system as well as the fact that many heavy metals may come from residential and even water supply sources. The toxicant studies currently underway are designed to help answer these questions. For these reasons Metro has concluded that heavy metals concentrations will probably remain lower in the Renton effluent than the West Point effluent.

15. The economic value of Green/Duwamish River steelhead fishery was included in the total fishery value of the stream. The other game fish species in the study area are principally freshwater species and anadromous cutthroat; these will be adversely affected by urbanization (Chapter 7). The economic value of these game fish to small communities in the study area was not estimated in the EIS because no data were available to prepare such an estimate.

16. According to the Orrick decision, potentially affected treaty tribes bear the responsibility to prove that a state or federal action would "proximately cause" fish habitat to be degraded such that the tribes' "moderate living needs" would be impaired. The only treaty tribe in the Renton study area is the Muckleshoot Tribe. The Muckleshoot Tribe received a copy of the Draft EIS and submitted comments. Those comments did not raise a question about degradation of inland salmon habitat due to urbanization. Nevertheless, EPA recognizes its responsibility to protect fisheries resources from secondary impacts. These impacts are discussed in the EIS. Appropriate mitigation of potential impacts, consistent with EPA statutory authority, is to implement recommendations from areawide water quality management plans. These measures are discussed in the EIS along with the local agencies responsible for implementation.

17. A statement recognizing the importance of farmlands, wetlands, and riparian vegetation has been added to the Final EIS.

18. The imperfections of the SEPA process are acknowledged. Nevertheless, SEPA does require preparation of EISs for citizen and public agency review whenever the impacts of a project may be potentially significant. Also, citizens and agencies have the opportunity to challenge declarations of nonsignificance if they disagree with the conclusions reached in these documents.

19. The final plan recommended program does call for removal of Renton effluent from the Green/Duwamish River. The rationale for rejection of decentralized systems is explained in Chapter 4 of the EIS and in Metro's Final Wastewater Management Plan.

STATE OF WASHINGTON
Department of
Natural Resources

COMMISSIONER
Brian J. Boyle
R. A. BESWICK
SUPERVISOR

South Puget Sound Area
28329 SE 448th Street
Enumclaw, Washington 98022

February 18, 1981

Re: Wastewater Management Plan
for Lake Washington/Green River Basins

Roger K. Machnick, M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Sir:

Thank you for the opportunity to review the Draft E.I.S. on the above project. The Department has no comments to make at this time.

Very truly yours,

James P. McElroy
Area Manager

David S. Pierce

David S. Pierce
Sound Unit Local Manager

DSP/jr

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BRANCH

AN EQUAL OPPORTUNITY EMPLOYER

Response to DNR Letter of February 18, 1981

1. No response required.

STATE OF
WASHINGTON
John Spellman
Governor

DEPARTMENT OF FISHERIES
115 General Administration Building, Olympia, Washington [illegible] [illegible]

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BRANCH

February 23, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

Draft Environmental Impact Statement
Wastewater Management Plan for the
Lake Washington/Green River Basins
METRO WRIA B-08 and 09

The Department of Fisheries has reviewed the above referenced DEIS. We have confined our general comments on the alternatives and our specific technical comments to those most applicable to the major design features of the Final Alternatives (A-1, A-3, A-5 and B-1) and the subsequent impacts on species under our jurisdiction.

General Comments

We concur with the choice of Preferred Alternative made in the DEIS. Specifically, we support diversion of the increasing effluent from the Renton STP out of the Green-Duwamish and into Puget Sound. Several of the specific technical comments we have on the DEIS and appendices strengthen the arguments made in the DEIS in favor of this diversion. Briefly, the salmon dollar values in the DEIS are too low and the analysis has omitted some potentially very significant impacts for Green-Duwamish salmonids. These serve to increase the potential benefit derived from the diversion.

The alternative we find the most satisfactory based on resources under our jurisdiction is diversion of the effluent to Puget Sound at Alki Point. The alternative which we would rank second is diversion to Point Pulley. Concerns for geoducks at Point Pulley and the oceanographic circulation in the southern portion of the central basin make this a less desirable alternative. The least desirable of the "Final Alternatives" were the two which increased the Renton effluent to the Green-Duwamish River. 1

Specific Comments

Salmon

The annual value of the salmon runs listed in the Appendices (p. C-91) is too low. Tables 1-4 (attached) detail the value of the runs in the Green-Duwamish drainage. The total annual value is over $4 million (rather than $2.6 million as stated). The values calculated by the Department in the attached tables are based on landed values (price paid to the fishermen). Use of retail prices for the commercial portion of the catch would increase these values even further.

The Department facilities in the drainage are valued at close to $4 million and have an operation and maintenance budget of $347,000 for fiscal 1981. The scarcity of good water supplies sufficient to support an operation of this size and the harvest-management implications of developing alternative drainages make replacement of these facilities in their entirety nearly impossible. ②

If a significant portion of the juveniles from the system or the in-migrating adults were adversely affected by water quality problems, the fish would probably be unreplacable. The production and returns to other hatcheries, for example, are all preprogrammed for their drainages. Transfer of large quantities of fish to attempt replacement of fish lost in a major fish kill, would in effect decrease production (and subsequent returns) in other rivers. Ultimately, fish would be lost in the fishery with corresponding economic impact. ③

The EIS should also discuss the implications of multiple year impacts on the resources. The economic impact would be increased in proportion to the number of years impacted. There is also a possibility of adversely affecting an entire stock of fish. If impacts occurred in successive years, the entire stock could become depressed, making recovery difficult. Effects on production and harvest could be felt for many years if this occurred. ④

Water Temperatures

In the second paragraph on page 140 of the DEIS high water temperatures are discussed. This discussion should be expanded in several ways. The inverse correlation between temperature and DO should be mentioned. Higher water temperatures will reduce the oxygen-carrying capacity of the water potentially compounding the effect on salmonids. The discussion centers around violations of DOE temperature standards presently. Some specific numbers such as maximum temperatures, the average of the upper 5 or 10 percent of the temperatures and/or the increased duration of the high temperatures diurnally would place more perspective on these violations. In addition to blocking migration, exposure to warm water temperatures during the last few weeks of adult salmon holding can reduce the viability of the eggs (p. 60, James Wood, Diseases of Pacific Salmon Their Prevention and Treatment, Washington Department of Fisheries, Second Edition, 1974). ⑤

Geoducks

The final EIS should address the potential impact on geoduck clams of the alternative outfall at Pt. Pulley (see attached excerpts from Progress Report No. 36). The outfall probably would entail construction in the geoduck bed and probably result in direct mortality to the clams in the path of the construction. Recent studies have shown that geoducks are long-lived. Beds will often average 40-60 years and individual clams may live beyond 150 years. Recruitment is sporadic and several years may pass between successful "sets" of young clams. Recovery following construction impacts would be very slow, therefore. ⑥

A second type of potential effect on clams relates to whether they can be certified for harvest. Department of Social and Health Services (DSHS) handles requests for certification of beds for commercial harvest. A written response from that agency should be sought on whether the outfall would make any clams uncertifiable which could be certified presently. Max Hayes (753-5959) of the Protection Unit in Olympia handles such matters for DSHS. ⑦

Due to the existence of geoduck beds around Point Pulley, we prefer the Alki discharge location. If one of the Point Pulley alternatives is pursued, an underwater survey might indicate a specific alignment which would minimize the impact on the clams. From such a survey, METRO could develop an estimate of the loss for the alignment having minimal impacts. The survey information will be of value to the Department in making its permit decision and for determining provisions for any permit we issue. ⑧

Oceanography

The circulation described around Vashon Island seems to recommend location of the discharge point for the effluent north of Point Pulley. We concur with the careful approach to this decision delineated on p. 141 of the DEIS. Good mixing and minimum retention in the Central Basin are obviously desirable. ⑨

Potential Failure of the Treatment System

The possibility of failure of the treatment facilities should be discussed. The discussion of possible failures should include any increased likelihood if an advanced treatment option were pursued at the Renton plant. The probable effect on the water quality and resources of the Green-Duwamish of an extensive failure at the plant should also be discussed. ⑩

Specific Construction Provisions

The Department of Fisheries will be providing specific construction provisions for the in-water work. These may include timing and allowable construction practices. They will be developed in response to specific plans submitted through an application for a Hydraulic Project Approval or, in marine waters, via the Corps of Engineers Public Notice for the project.

Thank you for the opportunity to review this document. If you have any questions concerning our response, please contact Mary Lou Mills (753-0576).

Sincerely,

Rolland A. Schmitten,
Director

cc: Max Hayes (DSHS)
Mary Lou Mills

Attachments

Table 1. DATA AND VALUES USED IN CALCULATING THE FISHERY CONTRIBUTION AND ASSOCIATED DOLLAR VALUES FOR THE NATURAL RUNS (TABLE 2) IN THE GREEN DUWAMISH DRAINAGE.

Species: Chinook (falls)
Catch: Escapement Ratio 2.4:1 1/

Gear	% Caught 1/	Average Weight 1/	Value
Recreational	39%	9.1 lbs	$4.28 3/
Troll	44%	12.9 lbs 2/	2.61 4/
Net	17%	17.1 lbs	1.45 4/

Species: Coho
Catch: Escapement Ratio 30.5:1 1/

Gear	% Caught 1/	Average Weight 1/	Value
Recreational	15%	4.1 lbs	$2.84 3/
Troll	32%	5.9 lbs 2/	2.04 4/
Net	53%	6.4 lbs	1.86 4/

1/ Fishing rate and catch distribution for chinook and coho are from the WDF stock models (Richard Lincoln, WDF Pers. Comm.).

2/ Dressed weight.

3/ 1979 Value based on 1977 retail value from WDF salmon landing statistics updated by U.S. Department of Labor, Consumer Price Index.

4/ 1979 value based on 1978 WDF Salmon landing statistics (unpublished) updated by U.S. Department of Labor, Consumer Price Index.

Table 2. CONTRIBUTION TO THE FISHERIES AND VALUES OF THE CATCHES OF THE NATURAL PRODUCTION OF THE GREEN-DUWAMISH DRAINAGE

Species	Escapement Objective (Natural)	Estimated Fishing Rate	Estimated Total Catch	Troll Catch		Net Catch		Sport Catch		Value of the Catch			Total Value/ Year (Natural Run)
				No.	Lbs.	No.	Lbs.	No.	Lbs.	Troll	Net	Sport	
Chinook	5,800 1/	2.4/1	13,920	6,125	79,010	2,366	40,465	5,429	49,402	$206,216	$58,675	$211,441	$476,332
Coho	1,000 2/	30.5/1	30,500	9,760	57,504	16,165	103,456	4,575	18,758	$117,471	$194,497	$53,271	$365,239

1/ Escapement Objective for 1980 from WDF Progress Report No. 107.

2/ Escapement Objective for 1980 from WDF Progress Report No. 108.

Table 3. HATCHERY DATA FOR THE GREEN-DUWAMISH DRAINAGE 1/

Capital Values of WDF Facilities

Green River Hatchery 2/	$3,500,000
Icey Creek #1 (upper) 3/	90,000
Crisp Creek (Spaight Ponds) 4/	58,000
Icey Creek #2 (lower) 5/	250,000
Total	$3,898,000

Annual Operation and Maintenance Costs for WDF Facilities

All facilities (fiscal 1981) except Icey Creek #2	$ 320,700
Icey Creek #2 (when complete)	27,000
Total	$ 347,000

Estimated Value of the 1981 Production at all Facilities

Chinook	$1,928,450 6/
Coho	1,604,540 6/
Chum	45,081 7/
Total	$3,578,071

1/ Personal Communication by Dean Wood, Salmon Culture, 1981.

2/ Current value including improvements since the 1940's.

3/ 1977 dollars.

4/ 1975 dollars.

5/ Under construction.

6/ Represents the value of the adults produced by 1981 plants taken in various fisheries 2 to 4 years after planting.

7/ 1980 project marine transport harvest (3,300 fish) multiplied times the 1979 value derived by updating the 1978 WDF net-caught salmon landing statistics with the U.S. Department of Labor, Consumer Price Indes (13.66/fish).

Table 4.

GREEN RIVER-DUWAMISH SALMON
PRODUCTION
TOTAL VALUE (ANNUAL)

Species	Natural	Hatchery Prod.	Total
Chinook	$476,332	$ 928,450	$2,404,782
Coho	365,239	1,604,540	1,969,779
Chum	-0-	45,081	45,081
Total	$841,571	$3,578,071	$4,419,642
Grand Total:			$4,419,642

Response to Department of Fisheries Letter of February 23, 1981

1. Though subtidal geoduck clams are found near Three Tree Point (Point Pulley), they are also found near Alki. They are found on both sides of Three Tree Point, but only on the south side of Alki Point. It is possible that geoducks near the discharge location may not be certified for commercial harvest, as a precautionary measure (see General Response Number 1).

2. The economic data in the Final EIS have been corrected to reflect these revised estimates.

3. Comment acknowledged. One reason for the choice to remove Renton effluent from the Green/Duwamish River is that fishery losses would be irreplaceable.

4. Comment acknowledged. The effects of multiple year impacts may be compound and result in a severe reduction in a portion of the fish stocks. It is unlikely that the entire stock would become depressed, since migration of anadromous salmonids generally occurs during periods of relatively high winter flow. Early running chinook adults (September) and juvenile salmonids rearing in the estuary in summer would be most affected.

5. Higher temperatures do reduce the oxygen-carrying capacity of water; however, the main cause of low oxygen concentrations in the river is ammonia from the Renton effluent. When the effluent is removed from the river, there should be adequate oxygen for salmonids despite temperatures that are above the state standard.

6. An analysis of effects on subtidal geoducks has been included in the Final EIS.

7. As noted in the Final EIS, certification for commercial harvest may not occur near the outfall.

8. Metro will conduct detailed studies prior to design of the outfall intended to provide this type of information.

9. See General Response Number 1.

10. In the event of a failure at the Renton treatment plant, primary-treated effluent would be temporarily discharged from the outfall to Puget Sound. Metro estimates that this would decrease plant performance from 90 percent removal

of BOD and suspended solids to about 30 percent removal of BOD and 60 percent removal of suspended solids. Failure of the primary treatment process is considered unlikely because of the mechanical simplicity of the process.

If nitrification were installed at the Renton plant, as in Alternative A-1, the risk of plant upset would be increased. If the nitrification process were to fail, secondary effluent would be discharged to the Green/Duwamish River, and adverse water quality and biological impacts similar to those described for the no-project alternative would result.

JOHN SPELLMAN
Governor

DONALD W. MOOS
Director

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Mail Stop PV-11 • Olympia, Washington 98504 • (206) 753-2800

March 11, 1981

MAR 16 1981
ENVIRONMENTAL EVALUATION BRANCH

Mr. Roger K. Mochnick
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue - Mail Stop 433
Seattle, Washington 98101

Dear Mr. Mochnick:

Thank you for the opportunity to review the draft Environmental Impact Statement (EIS) on the Wastewater Management Plan for the Lake Washington/Green River basins. Although your request for review and comment referred specifically to this EIS, I think it is also important to comment on the overall situation.

The Department of Ecology (DOE) is concerned about the impact of all point and nonpoint pollutant sources in Puget Sound and the Green/Duwamish River. We understand that METRO has considered the impact of the Renton discharge in relation to other discharges. Utilizing existing studies and reports, the EIS should draw conclusions and provide a summary discussion of the impact of the Renton outfall considering all pollutant loads to Puget Sound. ①

We are hopeful that the METRO planning process can rapidly be brought to a close so that they can develop needed financial planning and implementation proposals. The decision-making process is complicated by METRO's applications for marine waivers which are currently under review, but continuing inflation and threats to water quality are significant motivation to seek a solution rapidly.

We agree that only alternatives A-3 and A-5 could fully eliminate water quality concerns in the Green/Duwamish River which are presently caused or aggravated by the Renton discharge. Therefore, alternatives A-3 and A-5 are the only acceptable alternatives. We recognize the following advantages and disadvantages of the two general discharge locations:

Water Quality - There may be some qualitative water quality benefit to the Alki Point discharge. This is due to the predominantly northward flow of the marine currents in this area. The Point Pulley area has southward flow which may result in a discharge having a longer residence time in Puget Sound. Both discharge locations are acceptable since they offer immediate dilution of 100 to 1 within one mile of the diffuser and 500 to 1 in one tidal cycle. ②

Dollars - The Alki Point discharge location is between $80 to $110 million more expensive for capital cost and $60 to $88 million more expensive on a present worth basis than the acceptable Point Pulley discharge locations. This money could be used to solve more urgent water quality problems. There is some potential for future cost savings at the Alki location should the Alki treatment facility be abandoned and/or the Duwamish plant be constructed. These savings would not eliminate the cost advantage of Point Pulley. ③

Land Availability, Construction Impacts - There are significant problems in obtaining the right of way for the outfall along the Duwamish River, as well as significant traffic and business disruption during construction which would not be as severe with the Point Pulley discharge locations.

METRO should evaluate these factors and others in selecting the final discharge location. Additional water quality benefits should be shown along with other advantages to justify the much greater cost of an Alki Point discharge location. ④

Detailed comments on the EIS are enclosed. Please contact Norm Glenn of my staff at 753-2846 if you have any questions.

Sincerely,

Donald W. Moos
Director

DWM:hf

Enclosure

The comments below refer to specific pages in the draft EIS:

Page 27 - The value of the fishery resource is substantially undervalued. From a review of the catch records of the Department of Game, May 1, 1979 through April 30, 1980, we would anticipate that the economic value in current dollars of the fish harvest to the area may be two to three times the figures stated. These figures do not appear to take into account the cost of replacing the resource. Our figures indicate that the loss in terms of resource replacement and lost revenue from the catch for a single year for steelhead along would exceed $10,000,000 based on 1979 fish values and catch records. ⑤

Page 42 - Heavy metals concentrations for copper, chromium and zinc are at the threshold limits for affecting organisms in fresh water or above. Proposals to handle sludge at Renton and the interception of leachate from Cedar Hills to Renton STP will likely increase the levels of all the heavy metals in the effluent. This further supports the need to cease the discharge to the Green/Duwamish River.

Page 48 - The mound system is the same as a septic system, only the soil application method differs.

Page 59 - Control of BOD and solids is not within the scope of the METRO toxicant study. ⑥

Page 66 - 67 - Cost estimates for alternatives A-1 and A-3 are so close that their costs are within estimating errors and could, therefore, be considered equal economically. ⑦

Page 87 - It should be clarified that METRO does not have jurisdiction presently in the area of design, construction, operation and maintenance of onsite disposal systems. ⑧

Page 120 - Relatively high concentrations of heavy metals are found near the Alki Point and West Point STP outfalls. A similar situation may be expected surrounding the Renton STP outfall if it was diverted to Puget Sound although the risk of this is minimized because of the secondary treatment proposed at Renton. ⑨

Page 122 - The outfall to Puget Sound is a very key element of the proposed alternative. Impacts for the proposed outfall alternatives are adequately addressed for decision-making purposes. When the preferred location is selected, additional more detailed analyses of the impacts should be performed. ⑩

Page 124 - 125 - Loading levels of ammonia, nitrate and phosphate expected to be discharged into Puget Sound should be identified. The impacts of these nutrients on the water quality and biology in Puget Sound surrounding the outfall point should also be discussed. ⑪

Page 127 - A standby emergency power source should be provided at the Totem Lake pumping station in order to prevent bypassing of raw sewage into the Sammamish River. A bypass at the Redmond connection pump station at Totem Lake would not be permitted unless it is necessary to protect life or property. This subject should be furtehr clarified. ⑫

Page 143 - Alternative No. 4 (primary treatment to excess flows) is not acceptable because water quality violations would occur and fish kills would be a possibility.

Response to DOE Letter of March 11, 1981

1. See General Response Number 2.

2. See General Response Number 1.

3. See General Response Number 9.

4. Metro has evaluated the factors noted by DOE and other factors, and has recommended a Seahurst Park discharge in its final plan. EPA has also evaluated relevant factors and also has identified Seahurst Park as a preferred outfall location. The rationale for Metro's selection of Seahurst Park is summarized in Chapter 2 of the EIS and described in greater detail in Metro's Final Wastewater Management Plan. The rationale for EPA's decision is discussed in the Foreword to this EIS and in Chapter 8.

5. The economic value of Green/Duwamish fish stocks has been revised in the Final EIS. The total annual value exceeds $10 million.

6. This correction has been made in the Final EIS.

7. See General Response Number 11. Metro has performed an inflation analysis which shows that at inflation rates exceeding 3 percent, Alternative A-1 becomes more expensive than A-3 in present worth terms.

8. This correction has been made in the Final EIS.

9. The impact of heavy metals accumulations in sediments near the Renton outfall is described in the Final EIS.

10. Additional oceanographic and biological studies of the outfall are planned by Metro.

11. The Final EIS includes estimates of effluent quantity and quality, from which loadings can be calculated. The effects on water quality, algae, invertebrates, and fishes are also analyzed in the Final EIS.

12. Metro reports that such a standby power source would be in place.

REGIONAL AND LOCAL AGENCIES

PSCOG Grand Central on the Park • 216 First Avenue South • Seattle, WA 98104 • 206/464-7090
Puget Sound Council of Governments

January 8, 1981

Roger K. Mochnick, M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

RECEIVED
JAN 9 RECD
EPA-EIS

Dear Mr. Mochnick,

The King Subregional Council has reviewed the development of the Draft Renton Facilities Plan (Wastewater Management Plan for the Lake Washington/Green River BAsins) and the earlier Facilities Plan for the Puget Sound Plants. We appreciate this opportunity to review the Draft Facilities Plan and the Environmental Impact Statement, and submit the following general remarks and attached specific comments on the EIS document.

Our principle concerns are (a) the need now to look at both facilities plans as a single proposal within the context of declining revenues, (b) uncertainty over the level of treatment and discharge requirements for Puget Sound and the Duwamish River, and (c) the institutional prerequisites for the proposed "triggering mechanism" governing long term decision-making.

General Comments

A. Systemwide Alternatives

Metro facilities planning includes proposed plant abandonments (Alki, Carkeek Park) and rerouting of wastewater into the Renton service area for treatment, resulting in the concentration of King County wastes on the Duwamish River. The assimilation capacity of the River is severely limited during the summer months. (Summer flows at Auburn drop to 300 cfs during normal years, but the average annual flow is much greater at 1,360 cfs.) The Draft Plan suggests that the remaining choice is between two discharge tunnels connecting the Renton treatment plant to Puget Sound (at a cost of 128 million dollars or 198 million dollars, EIS, p. 72).

However, using the "building block" approach employed in each of the two facilities plans (Renton and the Puget Sound Plants) it might be possible to develop systemwide alternatives which avoid this cost and which are less costly overall than the identified "least cost" alternative. ①

As Metro enters this phase of its planning, we ask that you evaluate our illustration (specific comments, page 63) which considers the continued use and partial upgrading of the existing plants as the least cost systemwide alternative, and compares this to the combined Renton Facilities Plan preferred alternative and the Duwamish Configuration.

B. Receiving Waters

The Draft Plan assumes that "either higher levels of treatment will be required (for a Duwamish discharge), or else the treated wastewater will have to be diverted to Puget Sound" (Page 9). An alternative to either higher treatment or the tunnel options might be to "divert" only those future discharge volumes which exceed the present 36 mgd discharge.

Based on the EIS (pp. 138 and 143) it is unclear whether the present discharge is significantly detrimental to the Duwamish and how its removal would actually affect the Duwamish water quality (specific comments, pages 129, 141). ②

We suggest for consideration the continued use of the present 36 mgd Duwamish discharge, combined with delineation of a future Renton service area smaller than that assumed in the Draft Plan, and the use of a holding basin to receive the excess treated wastewater during the summer months. The holding basin could be a multiple use facility used for wintertime flood water retention. Such a facility located near the Renton treatment plant (also near the Black River pump station) is a key element in the flood control plan preferred by the Basin Executive Committee composed of the local governments in the valley. Costs could be shared. ③

This scheme would probably require the upgrading and continued use of the Alki and Carkeek Park treatment plants so that the West Point plant could continue to accommodate its present service area. The long term need for a Kenmore plant would depend in part on service decisions for south Snohomish County and site related decisions for the Metro service area.

C. Triggering Mechanism

For the long term, the Draft Plan clearly removes land use decisions from the Metro Council, and proposes modular system expansions triggered by the collection and interpretation of water quality data. However, adoption of this approach by the Metro Council for the long term portion of the Plan will not assure the active participation of the referenced agencies and jurisdictions to accomplish the following: ④

- Taking part in and jointly chairing the planning sessions triggered by the Metro data (EIS, p. 105),
- Monitoring of septic tank/groundwater interactions (EIS, pp. 187-8),
- Metro aid to local agencies in comparing on-site waste management proposals with conventional methods (particularly comparing total costs and benefits, and ensuring that the selected on-site methods for the "uncertain" sewer areas are compatible with possible future sewer construction),
- Routine preparation by PSCOG of sub-basin forecasts (EIS, p. 109) and the implied willingness of EPA to accept a range of forecasts reflecting uncertainties on such factors as national economic trends, political considerations, major investment proposals (Interstate 90) and funding for wastewater facilities themselves,
- A willingness by local communities and unincorporated areas to accept their "shares" of future residents,
- A coherent set of criteria for allocating federal, state and Metro revenues between the two facilities planning areas (Puget Sound Plants, and Renton service area) and for dealing with both point and non-point sources of pollution.

We note that local inaction in dealing with water quality issues identified through the triggering mechanism or other means can result in administrative directives from the State Department of Ecology which are exempt from the Resolution 2933 process.

In raising these institutional questions we recognize that short term decisions are not affected, and we recognize the limited authority of Metro to impose the necessary commitments. We believe that the Draft Plan and EIS will be useful in dealing in a collaborative way with the complex issues of pollution, growth management and limited revenues. We commend Metro, EPA and the consultant teams for preparing these very concise and readable documents.

Sincerely,

Doris Cooper
Councilmember Doris Cooper, Chairman
King Subregional Council

Enclosure

SPECIFIC COMMENTS

WASTEWATER MANAGEMEMENT PLAN
for the
LAKE WASHINGTON/GREEN RIVER BASINS

Page	Comment	
xxv, 159	While EPA and Metro are not "responsible" for growth it is clear that the pattern of development is largely an economic phenomenon influenced by grants for capital construction. The lack of such grants for new areas would also have an impact on presently served areas. This factor is corrected by the Clean Water Act of 1977 which provides funds for both centralized waste treatment systems and on-site systems and by resolution 2933 (Metro) which requires local jurisdiction certification of proposed capital construction. (One possible objection to Resolution 2933 is that it also gives local jurisdictions an effective veto over privately funded connections to the Metro system.)	⑤
3	Metro's planning effort for its Puget Sound plants has influenced the present study by recommending deemphasis of the West Point plant, thereby increasing the Renton service area. Metro Resolution 3163 authorizes this diversion "to the Renton treatment plant or another plant for treatment as part of the Renton 201 facility planning work." Policy positions for actual implementation have not been taken.	⑥
9	The Solid Waste Management Board for the King County area is the King Subregional Council of the Puget Sound Council of Governments.	⑦
14, 168	The Air Quality discussion is incomplete. For example, Bellevue CBD is only one of four CO hotspots in King County (others are Seattle CBD, Northgate, and the University District). The question is whether the level and distribution of growth affects pollutant concentrations in a significant and consistent manner. Two extremes to be avoided are excessive sprawl which would aggravate hydrocarbon emissions, and excessive infilling (i.e., due to a mismatch between infilling policies and actual infilling capacity relative to forecast growth) which would aggravate CO concentrations. In both cases, however, the major factor affecting future emissions and concentrations is the Federal Motor Vehicle Control Program.	⑧ ⑨

Specific Comments
Page Two

Page	Comment	
22	All of the maps should be oriented in the conventional manner with the north arrow pointing up.	⑩
38	It should be possible to indicate the actual chlorine contact time for high and low flows, comparing this to the required standard.	⑪
40	The wastewater flows for the summer months on Figure 2-10 do not agree with the numerical values given on page 41 (Table 2-7). Table 2-7 shows that during the periods of low Duwamish flows (the summer months), the design capacity of the plant have not been exceeded. This fact would appear to be more significant than the annual average flow (38.4 mgd) which does exceed the 36 mgd design capacity.	⑫
49	If average wet weather flow .s roughly proportional to population level, then the draft PSCOG population forecast corrections (September 10, 1980, and Don Pethick memo November 7, 1980) would increase the 101 mgd figure to 107.6 mgd. (The countywide population for the year 2000 rises from the previous figure of 1,575,300 to 1,678,800.)	⑬
62	Document the DOE "Lake Washington policy" and the "nondegradation policy", including copies in the appendix. Was the former adopted largely for fiscal reasons at a time when secondary treatment was not required for discharge into Puget Sound from areas of new growth (any waivers will apply only to existing discharges.).	⑭
63	It is our understanding that the screening of alternatives includes a fourth step: a double-check of the final proposal to see if any major decisions would be altered by higher population assumptions. Other assumptions will also come under periodic reviews through the proposed triggering mechanism which serves to evaluate both expansion timing and basic assumptions on which the plan itself is based (see the Draft Plan, p. 100).	⑮
63	Uniting the Renton Facilities Plan with the previous Puget Sound Treatment Plants Plan (1977), a different "least cost alternative" is apparent. This consists of secondary treatment at all existing plants except West Point for which a waiver has been requested.	⑯

Specific Comments
Page Three

Page	Comment	
63 (cont'd)	From the Regional Draft EIS (1977) Alternative E would cost 369.7 million dollars (Table 3-26). Subtracting the cost of West Point secondary, and converting to a Construction Cost Index of 3500, we arrive at a systemwide cost of 342 million dollars. (With the West Point Plant upgraded to secondary, the total cost is 497.7 million dollars.) The "least cost" alternative proposed in the present EIS would be joined to the assumed Duwamish configuration for the Puget Sound plants. The Duwamish scheme has a capital cost of 374 million (The Preferred Facilities Plan, August 17, 1978, Table 1). Subtracting the assumed Renton costs (121.4 million) and converting the new total to a Construction Cost Index of 3500, we arrive at a Duwamish cost (less Renton) of 294.7 million dollars. To this can be added the cost of the different Renton Facilities Plan alternatives. Using alternative A-5 (with the Alki outfall) we would add 300 million dollars (357 million less 57 million for tunnel and outfall costs covered by the Duwamish proposal). The total cost of the "least cost" alternative under a systemwide Duwamish plus Renton configuration is 595 million dollars. Adding Alternative A-1 to the Duwamish proposal would give a lesser total of 562 million, but this still exceeds the 342 million dollar alternative noted above. The above analysis is illustrative of how the "building block" approach suggested in the 1977 Facilities Plan discussions might be applied in developing a systemwide package, within future funding constraints.	
66	Indicate the energy commitment of the different alternatives as a percent increase over present levels. For example, the 98 million Kwh represents a 250% increase at the Renton plant and a 132% increase systemwide (base year figures for 1975 are given in The Draft Regional EIS, 1977, p. 401).	⑰
72	Alternatives A-3 and A-5 may remove effluent from the Duwamish, but this might aggravate the temperature problem as a net impact. If the high temperature is due to low flows rather than effluent (RIBCO, Part III, p. 185) the Duwamish discharge may be a benefit to the ex-	1

Specific Comments
Page Four

Page	Comments	
72	(cont'd) tent that it aids flushing. This might override any effects of the marginal temperature difference between the Duwamish and the effluent.	
	In future fiscal analyses Metro should consider delays and inflation as a possible "overriding factor" in alternative selection. What are the relative merits of each scheme with respect to potential lawsuits, administrative delays (etc.). The very low inflation of O and M costs assumed in the Plan should also be varied (a "sensitivity analysis"). What effect might a waiver request denial have now, or at the five year renewal period? In hearings before the Congressional Committee on Public Works and Transportation some participants reported that even for moderately sized projects (10 to 15 million dollars) they are avoiding the 75 percent federal grants because the grant does not cover the additional delay costs (Hearings, 96th Congress, October 30, 31 and November 1, 1979).	⑲
78, 79	Near term actions should not determine the long range alternative selection. Inclusion of the Renton Tunnel as a near term action is probably proposed here due to construction time needs and the rapidly increasing Construction Cost Index (historically rises twice as fast as inflation). The necessity of the tunnel should not be assumed, although the necessity for a clear and resolute decision on future Metro actions is imperative.	⑳
87	While Metro cannot generalize about specific sites, a commitment could be made in the Facilities Plan to help local agencies compare the total costs of onsite systems to centralized systems. The comparison would match the costs of interceptors, collector systems and treatment capacity (and discharge) to the costs of onsite systems and graywater facilities. Grants are available for both approaches.	㉑
122	The DOE minimum streamflow regulations are guidelines for reviewing future diversion requests; they are not instream flow guarantees against present diversion rights or the vicissitudes of weather.	㉒
125	The cost of removing the highly toxic chlorine residual is apparently very minor (see Table 3-7). Can any information be provided on the danger of chlorine reacting	㉓

Specific Comments
Page Five

Page	Comments	
	(cont'd) with wastewater to produce volatile chloroform which can then enter the atmosphere and react to destroy ozone (RAIN Journal of Appropriate Technology, April 1976). If this is the case, prohibitions against aerosol propellants would yield insignificant results in preserving the ozone layer.	
129	The question is whether the current mixing ratio of 4:1 is acceptable or not (DOE standard of 20:1 is a recommendation, page 143). Comments on pages 138 and 143 indicate that no harm is resulting from the present discharge. If the 4:1 ratio is acceptable, then the problem facing Metro is not so much one of removing Renton discharges from the Duwamish, but of ensuring that present discharges are not increased. This is particularly true if the causes of temperature and dissolved oxygen violations do not include the Renton discharge (RIBCO, Part III, p. 185).	㉔
	Consider the following scenario. The year 2000 flow can be reduced to 74 mgd if 27 mgd is retained in the West Point service area. Of the remaining 74 mgd only 61 mdg need be considered during the critical summer months (the 101 mgd flow used in the Plan and EIS is the Average Wet Weather Flow, while the Average Dry Weather Flow is applicable in the summer months; and a ratio of 5/6 for ADWF/AWWF can be derived from data on page 109). Subtracting 36 mgd (present discharge to Duwamish) from the 61 mgd (year 2000 discharge) gives a total of 25 mgd which might be disposed of in some manner other than the proposed tunnel outfall. A holding basin doubling as a wet weather drainage detention basin under the Green River Basin Executive Committee Preferred Alternative (to be located near the Renton Treatment Plant) could be used. A pond with a four month capacity and 15 feet deep (typical lagoon depth) would require 500 acres, the cost of which could be shared with the flood control project.	㉕
141	The description of the "impacts of no-project" appear to overstate the DO issue, judging from the information provided on page 135 (in 2000 the number of violation days increases from 77 due to natural or other causes unrelated to the outfall, to 89).	㉖

Page	Comments	
	(cont'd). Moreover, it is unclear whether the possibly beneficial flushing effects of present and future discharges on temperature have been considered in evaluating the DO problem (DO is diminished as temperature rises, and flushing would tend to moderate solar heating during the periods of natural low flow).	
150	The PSCOG does not reject the use of 2030 forecasts. These might be compared to unofficial 100 year forecasts prepared jointly by the PSCOG and local jurisdictions (Seattle, King County, Bellevue) in connection with the Seattle Comprehensive Water Plan, and noted elsewhere in the EIS. The important issue to PSCOG is that long term forecasts be used only for the specific purpose for which they were developed, and that near term actions based in part on such projections not be self-fulfilling. An outfall location determined by the assimilation capacity of the selected receiving waters, and separated from the land to be provided service by a modular treatment configuration, addresses these concerns.	㉗
153	Since the purpose of the Clean Water Act is to provide "swimmable and fishable" waters, these benefits--the purpose of the proposed action--can be noted in the discussion of recreational opportunities.	㉘
160	The PSCOG regional growth projections do in fact test the consequences of providing and constraining sewerage collection systems. These are the "trends" the "policy" numbers, respectively. This issue is handled better in other parts of the EIS.	㉙
	Future work by land use agencies should address the adequacy of the King County Sewerage General Plan service area (infilling) to accommodate new growth forecasts. One forum for doing this is the General Development Guide of the County, and one piece of useful information will be the Urban Infill study for the King County area being done by Real Estate Research Corporation.	㉚

Page	Comments	
165	The observation that any forecast diminishes in reliability as its time horizon increases, is appreciated. This applies to the Bureau of Economic Analysis forecasts endorsed (and required) by EPA for use in its funding programs. To the extent that funding decisions are influenced by the BEA forecasts EPA is influencing the economics of land use and the distribution of growth. This is not necessarily bad, but it does highlight the complexity of the land use questions (see comment for p. xxv, and 159).	㉛
169	Draft population forecasts for King County under review by PSCOG (Don Pethick, November 7, 1980) can be added to Table 6-3: 1980: 1,256,800 1990: 1,442,900 2000: 1,678,800	㉜
170	Changes in population forecasts do not necessarily require a re-evaluation of consistency between the Metro program and air quality programs. Air quality forecasts are imprecise. Altered population forecasts which are within the margin of error should not require major plan reviews.	㉝
172	The significant factor is not pollutant loading rates, but rather the actual removal rates during storm events.	㉞
179	Additional high growth drainage basins are indicated in King County's "King County Streams: A Disappearing Resource". Subbasins which are over 10 percent urbanized and which will experience at least a 50 percent growth in impervious surfaces are: Lake Sammamish, Juanity Creek, Black River, Mercer/Kelsey Creek, and Lower Puget Sound (in addition to those already listed)	㉟
183	It would be more accurate to say that PSCOG assumed a year 2000 unsewered population (as a basis for modeling) rather than that we projected the 124,078 unsewered population as a result of our modeling. The real figure will turn on relative costs, the King County program, etc. A leading planning question for Metro is the sensitivity of Metro proposals to variations in assumed ratios of sewered to unsewered population (e.g., as these variations affect the rate base and forecasted monthly service charges).	㊱

***

Response to PSCOG Letter of January 8, 1981

1. Metro's recommended program has incorporated this system-wide cost-effectiveness approach.

2. See General Response Number 3.

3. Such a holding pond scheme in a joint project with the proposed P-1 project was analyzed. A reservoir of some 500 acres (approximately the size of Lake Union) would be required to store effluent during the summer, low river flow period. The reservoir would essentially be treated as an aerated lagoon. The recreation aspects of the P-1 project would probably be compromised. Migrating salmon traveling upstream through the P-1 pump station fish passage structure would probably be eliminated. The cost of 500 acres of contiguous land and additional buffer area would be extremely high. The availability of such acreage is very questionable. The reliability and level of protection offered the river would be much less than diversion to Puget Sound. For these reasons, the summer storage option was dropped from further consideration.

4. The triggering mechanism is described in more detail in Chapter 4 of Metro's Final Plan. Parameters to be monitored include population, wastewater flows, and sewer service areas. In the event that monitoring indicates the need for some type of structural or nonstructural response, Metro proposes to notify local land use agencies of monitoring information to encourage their early involvement in decisions on needed response. Metro proposes to consult with these land use agencies for guidance as to the best land use planning scenario(s) to be used in facilities planning. In the non-sewer area, land use agencies would have the lead in identifying potential problems and determining needed responses.

5. The EIS, in Chapter 7 (Secondary Impacts), recognizes that wastewater facilities do play an important role in the urban development process. Nevertheless, the approach taken in the EIS is that regional wastewater facilities, such as those proposed by Metro, assist in accommodating the growth planned for and projected by general purpose governments.

6. The final Metro Facilities Plan's recommended program incorporates a rethinking of the West Point de-emphasis strategy. A decision on that strategy has been deferred until after planning for Metro's Puget Sound treatment plants has been finalized.

7. Table 1-1 has been corrected to reflect this comment.

8. The EIS is concerned only with those CO hotspots within the Renton study area, and Bellevue is the only such hotspot.

9. The relationship between urban growth and air quality impacts is quite complex, as the comment correctly notes. Nevertheless, the approach of the Clean Air Act toward determining project consistency with State Implementation Plans (SIPs) relies on determining the consistency of the growth projections underlying the project and the SIP, and this approach is therefore the appropriate one to be employed for the EIS.

10. The maps are intended to be read by turning the document 90 degrees, so that north is on the reader's left.

11. Current disinfection practice at the Renton treatment plant is to dose effluent with chlorine gas and maintain a contact time of about 1 hour in the chlorine channel. Before discharge to the river, the effluent is dechlorinated with sulfur dioxide to reduce the chlorine residual to chloride ion and prevent toxic effects on aquatic life upon discharge.

12. The tabulated historical flows are considered to be more accurate than the graphed flows. However, updated historical flows for the summer of 1980, as shown on Figure 1-5 of the Final EIS, show that the design capacity of the plant has now been exceeded even during the low flow summer months.

13. The updated population forecast would result in slightly higher wastewater flows. However, Metro staff believes the difference is not significant enough to require provision of increased capacity for the year 2000 at the Renton plant. If the revised forecast were to be realized, the year 2000 capacity provided at the Renton plant would be used up slightly sooner than the year 2000, and planning for additional expansion would be undertaken slightly sooner.

14. These policies are documented in Chapter 6 of Metro's Companion Document to the Wastewater Management Plan. DOE has stated that discharges to Lake Washington, even with secondary treatment, would not be acceptable. This is presumably based on water quality rather than cost considerations.

15. This statement is correct and no response is required.

16. See General Response Number 6 above.

17. Current energy use of the Renton plant has been added as a footnote to Table 6-9 of the Final EIS, for comparative purposes.

18. See General Response Number 3. High temperatures are mainly a result of lack of riparian vegetation(shading). Since the effluent is usually warmer than the river, the

effluent does have an adverse effect on temperature. The effects of effluent flow per se on temperature would not be significant in the short reach of river between the plant outfall and the estuary.

19. The impact of inflation and its impact on the ranking of alternatives was considered in Metro's Draft Plan. At inflation rates greater than 3 percent Alternative A-1 has a greater present worth than Alternative A-3. The financial planning section of the Final Plan (draft, pages 78-83) displays the impact of inflation on monthly sewer rates.

As explained on page 50 of the Draft Final Plan, the accuracy of cost estimates and probability of lawsuits and administrative delays is considered to be equal for all alternatives and thus not an overriding consideration. Thus, we did consider these factors but determined that they did not alter the selection of a preferred alternative.

20. The notion of near-term projects was developed for the Preliminary Plan. At that time Metro staff had not completed its evaluation of the alternative long-term wastewater management programs and had not identified a recommended or preferred program for the Renton system. So as not to bias the evaluation and selection of a preferred long-term program, all near-term projects had to be consistent with all of the long-term wastewater programs being considered. The tunnel to Puget Sound was not identified in the Preliminary Plan as a near-term action because it was not a common element of all the alternative long-term programs. Because the recommended long-term program described in the Draft Plan called for diversion of Renton treatment plant effluent to Puget Sound, the tunnel became a near-term action consistent with the long-term program. In the Final Plan the recommended long-term program (Chapter 3) is discussed in a chapter separate from the near-term collection system projects (Chapter 5). The tunnel is a key element of the long-term program. The near-term collection system projects are all fully consistent with the recommended long-term program.

21. Pages 98 and 99 of the Draft Plan explain how the costs of sewers and on-site systems can be compared. The Renton facility plan is a regional wastewater plan that was not intended to address site-specific, community scale nonsewer or sewer issues.

Sewer vs. septic tank issues must be addressed on a case-by-case basis at the local community level. One of the primary functions of the triggering mechanism (Chapter 4, Draft Final Plan) is to initiate such analyses in nonsewer areas.

Metro's present Facilities Plan is not a plan for seeking federal or state funding for on-site system recommendations. Both federal and state funding programs have specific set-asides to ensure funding opportunities for innovative and alternative wastewater projects. Therefore, there should be minimal effects of the present Facilities Plan on future funding for implementing nonsewer recommendations. Since EPA will not be asked for funding of nonsewer projects as a result of Metro's Facilities Plan, this EIS does not evaluate costs and impacts of the detailed nonsewer recommendations.

22. A correction has been made to the Final EIS text to reflect this fact.

23. There is no specific information on this occurrence in the Renton system. Dechlorination may not be used because there may be sufficient chlorine decay in the effluent pipe due to the long detention time. In any case, dechlorination would not destroy the chlorinated organic compounds formed during the chlorination process. If this is a problem, then the answer would probably lie not in dechlorination, but in an alternative disinfection process.

24. See General Response Number 3. A 4:1 ratio is not acceptable. The DOE would like a 20:1 ratio. A 4:1 ratio results in metals concentrations above EPA standards. Recent studies indicate the Renton discharge is a causative factor in temperature and dissolved oxygen violations. Present flows of 36 MGD to the Duwamish are not acceptable.

25. See General Response Number 3 above.

26. See General Response Number 3. The number of violation days refers to temperature, not dissolved oxygen. The Final EIS considered the possible beneficial flushing effects of the discharge, and found that the discharge has a net detrimental impact on the estuary. The flow effects of the discharge would not lower the river temperature except when the temperature of the effluent is lower than river temperatures.

27. The Seattle comprehensive plan population forecasts in their current form cannot be disaggregated for the sewer service area and Renton study area. If PSCOG is able to reaggregate the Seattle comprehensive plan projections into a comparable form, the forecasts might be useful in planning (sizing and staging) nonmodular facilities.

28 This concept has been added to the Final EIS text.

29. Although the policy forecast does constrain sewerage availability, it is not truly a no-project forecast. Such a forecast would assume a lack of further expansion of regional treatment plant capacity at the Renton plant, which is a far greater constraint than merely limiting the availability of sewerage facilities to close-in portions of the study area.

30. No response required.

31. No response required.

32. These forecasts have been added to Chapter 7 of the Final EIS.

33. This comment is correct. Minor changes in population and emissions forecasts would not require a re-evaluation of the Metro program for consistency with the SIP.

34. Pollutant loading rates have been used as a rough index of nonpoint source pollution potential in the EIS. A more refined analysis would consider removal rates, as noted by the comment, but such a refined analysis is beyond the scope or needs of the EIS.

35. The additional high-growth drainage basins have been noted in an addition to Chapter 7 of the Final EIS.

36. This correction has been made to Chapter 7 of the Final EIS.

PSCOG Grand Central on the Park • 216 First Avenue South • Seattle, WA 98104 • 206/464-7090
Puget Sound Council of Governments

February 5, 1981

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FEB 9 1981
ENVIRONMENTAL EVALUATION BRANCH

Roger K. Mochnick, M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick,

On January 8, 1981, the King Subregional Council submitted to you its comments on the Draft Renton Facilities Plan and Draft EIS. One suggestion raised in the review was the use of a holding pond to receive treated Renton STP wastewater during the low flow period of the Duwamish River.

We are submitting a variation of this proposal which would provide additional treatment to the increase in Renton loads, but not to the total Renton load. This could avoid what might be an insurmountable land assembly problem.

We are asking that the attached material, together with the original proposal, be treated as an alternative within the final EIS. The major feature of this alternative is that it avoids the high costs of the discharge tunnel under A_3 and A_5, and also avoids the costs of totally upgrading the Renton plant (A_1). In both of our suggestions, the total flow handled by the Renton plant in 2000 is reduced by routing the northern part of the proposed service area to West Point (and possibly a later Kenmore plant). ①

The pivotal issues in this alternative are the actual condition of the Duwamish River under present Renton loadings, the relative importance of the Renton discharge compared to other point, non-point and natural causes of pollution, and the net effect of removing the total Renton discharge. On behalf of the King Subregional Council, we are asking that these questions be addressed in the final EIS. ②

Sincerely,

Doris Cooper

Doris Cooper, Chairman
King Subregional Council

King Subregional Council • 655 - 120th N.E. • Bellevue, Washington 98005 • 206/455-7667

PSCOG Grand Central on the Park • 216 First Avenue South • Seattle, WA 98104 • 206/464-7090
Puget Sound Council of Governments

MEMORANDUM January 29, 1981

FEB 9 1981
ENVIRONMENTAL EVALUATION BRANCH

TO: Water Resources Committee

FROM: Pete Beaulieu

SUBJECT: Renton Facilities Plan Alternatives

In the January 8, 1981 letter to EPA regarding the Draft Renton Facilities Plan and EIS, the King Subregional Council recommended that the "building block" technique be used to develop additional systemwide alternatives. One illustration, involving joint use of a Renton area holding basin for treated wastewater--an alternative to the proposed Renton tunnels--was explored.

Because of the land requirements--500 acres--a second more realistic configuration is sketched below. Both alternatives assume a continued 36 mgd discharge of secondary treated waste into the Duwamish, with the new facilities handling any additional flows, which are diminished by a further assumption that flows from north King County (27 mgd in 2000) will not be routed to the Renton plant.

The new alternative would provide "advanced" treatment for any flows above the current discharge(The term "advanced" is somewhat of a misnomer since nitrification was a common treatment step prior to the 1930's.) While extra treatment is apparently required only during the summer time low flows in the Duwamish, the process would be utilized continuously to avoid the operational problems of switching the facility "on" and "off". This alternative differs from Alternative A_1 only in the amount of wastewater treated at this higher level (37.5 mgd rather than 101 mgd, in the year 2000). It differs from Alternatives A_3 and A_5 in the elimination of the costly tunnel to Puget Sound. ③

Treatment Load

Draft Plan design flow for the year 2000	101 mgd
Adjusted to reflect PSCOG forecast revisions[1] (submitted Sept. 1980)	108 mgd
Less the north King County portion of the West Point service area	-27 mgd
NEW TOTAL	81 mgd

Treatment Load (cont"d)

TOTAL	81 mgd
Adjusted to reflect ADWF rather than AWWF[2]	67.5 mgd
Less continued Duwamish discharge	-30 mgd
FINAL TOTAL	37.5 mgd

If the nitrification process is only 85 percent effective, the year 2000 discharge from this process, combined with the 30 mgd discharge of secondary treated waste, would be the equivalent of the present 36 mgd discharge.

A key issue is whether or not the present 36 mgd discharge can in fact continue. Is the Duwamish threatened by the existing discharge, or is it threatened by increases in this discharge? The SRC observations on this point are addressed in the Draft EIS critique (see attached remarks for pages 72,129 and 141 of the EIS). Is degradation of the Duwamish due to sources other than the Renton outfall, and secondly, does the flushing effect of that outfall (more than) offset the detrimental effects of a Duwamish discharge? These questions should be more adequately addressed in the final EIS. Depending on this analysis, the present proposal may or may not be a workable one. ④

Important aspects of the proposal to treat only part of the future Renton load beyond secondary, are the following:

(a) The site needs would not exceed two or three acres, compared to 500 acres required by summer storage,

(b) The 37.5 mgd load could be reduced further (5 mgd) if the secondary effluent[3] is made available to possible solid waste facilities, ⑤

(c) It may or may not be compatible with the treatment needs of future industrial customers, although pretreatment approaches would not require a tunnel at a later date,

(d) Growth beyond the 20 year horizon might require a tunnel, although new technologies (on site) and eventual construction of a Kenmore plant would reduce any "need" for a tunnel at Renton. (Such facilities could be funded by the revenue savings.) The tunnel proposal should not be based only on anticipated growth beyond the year 2000. This is particularly true for long term growth in the Kenmore area. ⑥

(e) If a Duwamish plant is needed in the future to handle industrial wastes, then a tunnel might be built from that site, thus avoiding the majority of the costs of the tunnel in Alternative A_5 which passes the Duwamish plant site,[4] ⑦

(f) If secondary treatment is eventually required at West Point, then the assumption that this plant might be scaled down and abandonned becomes increasingly remote, and the rationale for routing a large part of the West Point service area to Renton--rejected under the present proposal--is removed. ⑧

(g) During those infrequent years when the Duwamish flow might drop below 300 cfs, treated wastewater could be stored in the flood water detention basin proposed by the Basin Executive Committee in its work with the Soil Conservation Service. Because most of the treated wastewater would continue to be discharged into the Duwamish, the storage needs would be much more modest than the 500 acre figure associated with an absolute summertime storage proposal. Joint funding for the storage facility would require a relatively insignificant contribution from Metro, but might represent the difference between success and failure in the flood water program.

(h) Even if the total year 2000 flow (67.5 mgd instead of 101mgd) is given advanced treatment, this may be preferable to the tunnel option. To what degree can it be decided now that the Renton plant--because of the high cost of eliminating a Duwamish discharge--will be restricted to a certain maximum size? Is the Kenmore plant a long term goal, and if so, can we get by with one tunnel (at Kenmore), rather than two (the first at Renton)? ⑨

notes:

1. Probable revisions to the PSCOG forecasts include a 6 percent increase in the year 2000 population for King County.
2. Average Dry Weather Flow is the appropriate figure for dealing with the low flow period in the Duwamish. A ratio of 5/6 is derived from data on page 109 of the EIS.
3. Solid waste facilities require 350 to 2000 gallons per ton. The daily 1986 tonnage will be 3700 (1.3 to 7.4 mgd).
4. Of the "tunnel" cost (198 million dollars, only 50 million dollars is for the tunnel itself(Draft Plan, p. 72).

Response to PSCOG Letter of February 5, 1981

1. Elements of the PSCOG proposal have been evaluated in the Final EIS, in that the final plan recommended program evaluated in the EIS does assume that the Renton plant will not treat flows from the north part of the service area. Although the PSCOG proposal would reduce threats to the Green/Duwamish River water quality and aquatic biology, EIS analysis of the impacts of the existing discharge (which is about 40 MGD rather than 36 MGD), and the impacts of a nitrified discharge, indicates that diversion of the projected year 2000 flow of 73 MGD from the Renton service area to Puget Sound is still justified to avoid adverse impacts on the Green/Duwamish River.

2. See General Response Number 3.

3. In order to remove ammonia (through nitrification) from only future flows, essentially two separate treatment systems would be constructed. The existing 36 MGD liquid stream plant would continue to operate in a secondary treatment mode, while expansion to 72 MGD and subsequently to 99 MGD would be accomplished by adding components to achieve nitrification. Since the ammonia conversion process is a biological one, a specific population of micro-organisms must be maintained. This necessitates separation of the secondary systems. Primary treatment would also be segregated since alkalinity dosing would be required prior to nitrification in order to maintain suitable pH levels.

Primary solids and waste sludges from both secondary systems could be processed in the same solids handling facilities. As with the other Renton plant options gravity thickeners would be used for primary solids, and dissolved air flotation for waste-activated sludge. Both sludge streams would be stabilized in anaerobic digesters and then dewatered.

Operation of the Rention plant in this partial nitrification mode would add a significant degree of complexity to plant functions, and disproportionally increase staffing and laboratory requirements. The increased complexity would also affect "reliability" such that the probability of process upset is increased. Estimated costs for a partial nitrification alternative treating 99 MGD by the year 2000 are $237.4 million in present worth terms. This is $41.6 million cheaper than Alternative A-1 and $29.6 million cheaper than Alternative A-3. However, the key point is that this alternative requires continued discharge of 36 MGD advanced secondary effluent to the Duwamish River. In the judgment of water quality and fisheries agencies, including EPA, this would not provide acceptable protection for water quality and fisheries.

4. See General Response Number 3. Fishery resources are threatened by existing discharge levels. EPA water quality criteria are being violated, and conditions would become lethal to salmon if high pH algal blooms were to occur. Such blooms have occurred in the past, under conditions of lower treatment plant flow, and there is no basis for predicting they will not occur in the future. The Final EIS analyzed the flushing effects of the discharge, and the cumulative impacts of other activities in the watershed on water quality.

5. Potential reductions of this magnitude in the volume of treated effluent requiring discharge do not represent alternatives to the overall concept of marine discharge. At best they might delay the need for marine discharge facilities.

6. Metro's preliminary plan compared alternatives with one tunnel from a Kenmore plant and with two tunnels from Kenmore and Renton plants. The former was less expensive, assuming advanced secondary treatment at Renton with Duwamish discharge. However, that strategy would not completely protect Duwamish water quality. When nutrient removal was added to the Renton treatment, the one-tunnel alternative becomes more expensive than the two-tunnel alternative. This does not consider the impact of inflation on operation and maintenance costs, which would further favor tunnelling over advanced treatment.

7. See General Response Number 9.

8. A final decision as to whether to reroute flows from the West Point service area to the Renton plant has not been made.

9. The Kenmore plant remains a long-term option in Metro's final plan.

CITY OF KIRKLAND
210 MAIN STREET · KIRKLAND, WASHINGTON 98033 (206) 822-9271

January 28, 1981

Mr. Roger K. Mochnick
M/S 443, Environmental Evaluation Branch
U. S. Environmental Protection Agency
1200 6th Avenue
Seattle, Washington 98101

JAN 29 1981
ENVIRONMENTAL EVALUATION BRANCH

Dear Mr. Mochnick:

Thank you for the opportunity to review the Draft Environmental Impact Statement for Metro's Waste Water Management Plan for the Lake Washington/Green River Basin. After reviewing this document with my staff, we find that we have no substantive comments to make at this time.

However, we would like to express our concern that the resource recovery alternatives for sludge disposal have not been included as part of the recommended alternatives. We feel that this is a significant aspect of any waste water management plan and should be an integral part of the final adopted proposal. ①

Once again, thank you for the opportunity to comment on this project.

Sincerely,

DEPARTMENT OF COMMUNITY DEVELOPMENT

Joseph Tovar
Acting Director

SW:bk/4115A

Response to City of Kirkland Letter of January 28, 1981

1. See General Response Number 5.

HIGHLINE PUBLIC SCHOOLS SCHOOL DISTRICT 401

EDUCATIONAL RESOURCES and ADMINISTRATIVE CENTER
15675 Ambaum Boulevard S.W. • Telephone • 206/433-0111
Seattle, Washington • 98166

February 5, 1981

Mr. Roger Mochnick
Mail Stop 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98104

RE: Draft Wastewater Management Plan, Lake Washington/Green River Basins (Renton 201 Study).

This letter is in response to the proposed Draft Wastewater Management plan described in the Renton 201 study as Alternative A-3. This alternative proposes to deposit the effluent discharge into Puget Sound near Point Pulley and the Seahurst Park area.

Since 1968 the Occupational Skills Center has operated the Marine Technology program at Seahurst County Park. It is cooperatively owned and operated by the Highline, Federal Way and South Central School Districts. Each school year the program provides 400 hours of vocational training for forty high school students interested in pursuing a marine related career. This includes such fields as hatchery management, water quality control, oceanography, marine biology and aquaria operation.

The salt and non-chlorinated stream water systems made possible by the shoreside location of the facility, allow students to develop marine related skills and knowledge through direct experience. In addition, the water systems are used in conjunction with group tours, special classes, and a small number of research projects. Public viewing aquaria, a conditional part of the lease of the land at Munro Seahurst Park, are made possible by the two systems.

The sea water system consists of two parallel three inch diameter plastic suction lines extending west from the Marine Tech lab about nine hundred feet from the bulkhead. From a depth of twelve to thirty feet, a volume of twenty-five to forty gallons per minute of sea water is pumped into the lab. Only one suction line is used at a time. Fresh stream water is back-flushed down the other line to kill marine fouling organisms which would soon reduce, then stop the flow. The lines are alternately used for suction and back-flushing and are cycled on a weekly basis.

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The program and facility also includes a small salmon hatchery, a cooperative program licensed by the State Department of Fisheries. Since 1972 Coho and Chinook salmon have been incubated, reared and released along the beach at Seahurst Park. The annual return of mature Coho salmon to the fish ladder and small holding pond in the two hundred g.p.m. stream adjacent to the lab is a community event. In December 1980, over one hundred fifty salmon provided over one hundred twenty thousand eggs. Under the direction of state fisheries biologists the students will plant excess Coho fry in nearby streams. Fishermen have found the bay off Seahurst to be increasingly productive. ①

Biological sampling and fishing methods are taught, using a one hundred twenty foot beach seine, ten foot otter trawl, biological dredge, plankton and dip nets. A variety of standard oceanographic instruments are used to sample the water and sea bottom.

Several articial reefs are located one thousand to fifteen hundred feet off shore from the Marine Tech lab. They are very popular with scuba divers and fishermen, and have been used for marine studies in previous years. ②

The Highline School District is very concerned that the proposed alternative will negatively impact the Marine Tech program.

Due to run-off, there is a total net flow of water out of Puget Sound at the surface. However, the circulation of East Passage (the channel between Highline and Vashon Island) south of Alki Point is southerly, and very sluggish. This means that effluent would have a long detention time and flush out of Puget Sound only after circling Vashon Island. Locally a complicating factor is the back eddy which sets north from Three Tree Point along the near shore area toward Seola Beach. One concern is that the less dense effluent will migrate toward the surface, circulate around in a counter-clockwise direction, and become concentrated by the onshore winds in the near shore region off Seahurst. Although treated, the effluent could add heavy metals and toxicants to the receiving waters. Even though tests anticipate the proper disposal of effluent, it appears that as the discharge of 100 million gallons per day, and an ultimate discharge of 140 million gallons per day continue, it will undoubtedly impact the area. With sensitivity of the Marine Tech program, a short term system malfunction, or addition of toxic materials by accident, could have a negative impact that might take years to overcome. ③

The Seahurst Park area has a southwest to northwest exposure with prevailing onshore winds. If this warmer liquid from the sewer effluent rises to the surface it will come ashore in the Seola Beach to Three Tree Point area. This will impact not only the Marine Tech program, but the recreational use of Seahurst Park.

The Highline School District suggests that other alternatives, which have a much lesser potential negative impact on the local area, be considered.

Sincerely,

Robert D. Sealey
Superintendent

RDS/dgb

Response to Highline Public Schools Letter of February 5, 1981

1. The discharge of treated effluent should not affect salmon rearing facilities because salmon are reared in freshwater supplied from a nearby creek. Scientific evidence indicates that minute concentrations of treated effluent in marine waters will not affect the adjustment of released salmon to saltwater, nor the homing instincts of returning salmon.

2. Metro's engineering consultant reports that the outfall can be designed so as to avoid the artificial diving reef.

3. The Final EIS finds that although diluted effluent may infrequently approach beaches, the concentration would not be great enough to affect shellfish, public health, or other beneficial uses. Also, the frequency of diluted effluent surfacing is predicted to be less at Seahurst than at Alki Point (see General Response Number 1).

King County, State of Washington
Ron Dunlap, *County Executive*

Department of Budget and Program Development
Room 400 King County Courthouse
516 Third Avenue
Seattle, Washington 98104
John M. Rose, *Director*
(206) 344-3434

February 10, 1981

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ENVIRONMENTAL EVALUATION
BRANCH

Roger K. Mochnick
Environmental Evaluation Branch
U.S. Environmental Protection Agency
M/S 443
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Mochnick:

Several county agencies have reviewed the draft environmental impact statement on the Draft Wastewater Management Plan for Lake Washington/Green River Basins. King County's Environmental Impact Committee has also reviewed the statement and the responses from County departments. As chairman of the County's Environmental Impact Committee, I am transmitting the results of these reviews as a consolidated response from King County.

Our comments are organized according to various subject headings to facilitate your review and response.

Assumption About Future Sewage Needs

The Wastewater Management Plan states that most facilities are planned to meet sewage needs for a twenty year period. The plan and the EIS clearly show how most facilities are designed for the population expected to locate within the current sewer local service area in the next twenty years, as forecast by the Puget Sound Council of Governments. However, in the preferred program, some facilities will be sized to meet sewage flows for fifty years. How are the fifty-year flows calculated, and what assumptions are made about the non-sewer area where land use is considered "uncertain"? Is it assumed that fifty years growth will locate within the current local service area, or that new acreage will be sewered? ①

The plan states that dual sewage treatment facilities would provide more flexibility to respond to changing population distribution. In choosing the centralized facility, rather than dual facilities, what is the cost of losing that flexibility? The plan asserts that, in some cases, it is more cost effective to build a fifty year facility than to build a twenty year facility. In those cases, the assumptions behind the planning and decisions to build a longrange facility should be spelled out, so that the risks and the possible benefits, including potential cost saving can be examined. ②

The Plan points out the uncertainty about future land use plans, the magnitude of population growth, and the expected location of population growth within the study area. What degree of flexibility does the preferred program have to respond to changing land use plans? ③

Predictability and Funding

The DEIS and Plan describe an extensive list of additional studies that are necessary prior to final design decisions on the selected alternative. These studies, some of which will require a year to complete, are planning level investigations that are normally conducted prior to the selection of alternatives, rather than "confirming" studies that are part of the final design process (e.g., geologic, oceanographic and engineering studies). The extent and timing of the required additional studies raises questions regarding the predictability of the tunnel alternatives as compared to other options, especially alternative A-1.

Tunnel alternatives also require land and easement acquisitions and are subject to additional permitting actions (shoreline permits, 404 permits for spoil, etc.) and potential legal action. Variables and unknowns resulting from the studies, land negotiations and permit processes could dramatically affect project design, project costs and possibly the feasibility of the preferred program. The final environment impact statement should discuss predictability as a function of its effect on the "ability to implement" each alternative. Further the final statement should identify the process for reevaluating the selected plan, should major problems make it infeasible or impractical. ④

The availability of state and federal grants, particularly Section 201 construction grant funds, is a major economic factor affecting the implementation of any alternative. It would appear that alternatives which require considerable additional study would tend to jeopardize opportunities to capture 201 funding. The final environmental impact statement should more thoroughly describe the lead times required for each alternative prior to construction financing and the relative degree of risk associated with uncertainty and delay and the potential effect on funding opportunities. ⑤

Spoil disposal

The issue of spoil disposal should be expanded in the final EIS to discuss more specifically how approximately 200,000 cubic yards of material from tunneling will be moved and ultimately disposed of. Consideration should be given to the preparation of a spoil disposal management plan because of the significant quantity of excess spoils and time involved to move the material (i.e., 47 trucks per day over an 85 week time period) and the potential impacts related to earth movement and disposal. The statement should deal with the questions of alternative disposal sites and impacts at ⑥ those sites; methods of removal and haul routes for transporting; required permits; costs of disposal including site acquistion costs, transportation costs, fees for disposal; and should discuss probable beneficial uses (i.e., landfill, cover material at solid waste sites, etc.) and opportunities for such uses to offset disposal costs.

Impact on South Puget Sound

More information is needed regarding effluent dispersion, effluent residence time and cummulative water quality impacts on South Puget Sound from a Point Pulley outfall. The draft EIS notes that net circulation patterns at Point Pulley will draw diluted effluent further south in the Sound and around Vashon Island before transport out of the system. Effluent will be mixed with storm-water runoff and industrial discharges entering Commencement Bay from Tacoma. ⑦

The EIS should discuss how this added increment of sewerage effluent will affect the water quality balance of South Puget Sound which currently is stressed and has been documented as an area evidencing chemical contamination and biological abnormalities (NOAA Technical Memorandum OMPA-2, Nov. 1980). The statement should discuss the potential for maximum pollutant loading as a result of plant failures and spills both within the system and from external sources and the immediate impacts to localized areas as well as cumulative impacts on South Puget Sound. ⑧

Information should also be provided to document the impacts of up to 30% of the diluted effluent permanently encircling Vashon Island, particularly to areas such as Quartermaster Harbor where tidal flushing is slow, or to areas where eddy currents may retard water replacement such as between Point Pulley and Point Robinson. If possible, information should also be presented on the relationship of nutrients and the red tide. ⑦

Effect on the Green/Duwamish

The water quality analysis of the alternatives overlooks the impact of further reduction of the Green/Duwamish River low flows by elimination of Renton effluent discharges and the benefits of properly treated discharges as flow augmentation. Renton discharges could comprise of up to 25% of the total volume of the river at point of discharge. The net effects on water quality should be the primary consideration. For example, the draft environmental impact statement claims that improvement in dissolved oxygen (DO) will occur if the Renton discharges are eliminated, but does not go on to state that lower flows could aggravate the low DO problem by allowing the salt water wedge to position itself further up the Duwamish. To what extent are they offsetting? ⑨

The relationship of DO and the wedge was a concern raised in RIBCO and in a February 25, 1980 a letter fom Metro to the Department of Ecology. In the same letter Metro called for the establishment of a minimum streamflow of 250 cfs higher than that proposed by the state. Yet the Metro preferred alternatives reduce total river flows by up to 150 cfs by the year 2000. Is this consistent? Has the value of reclaiming and reuse of wastewater been underestimated? ⑩ The final environmental impact statement should state how the directives of the Clean Water Act for consideration of beneficial uses of reclamation and recycling of wastewater is addressed in Metro's planning. Decisions on the Renton plant should assure that water quality and water resource management objectives for the Green/Duwamish system are consistent and mutually supportive. ⑪

The four final alternatives appear to be "all or nothing" options with little or no flexibility for management and operation variations. For example, advanced treatment with nitrification could be utilized during the low flow period only. The majority of the plant expansion would therefore be for advanced secondary (similar to existing capability and also needed in alternatives A-3 and A-5) with only the lowest volumes during three low flow months requiring nitrification. RIBCO briefly discussed this approach (p. 78,Part III, Water Quality) and mentioned breakpoint chlorination and dechlorination, addition of lime to the primary clarifier, as well as nitrification as alternatives for removing nitrogen compounds. Addition of lime was the least-cost treatment process alternative. A seasonal treatment option should also be addressed in 201 planning and in the final statement. ⑫

Several major mitigation possibilities appear to have been overlooked. First, temperature standards violations will likely continue as a problem in the system regardless of which alternative is implemented. River shading and flow augmentation are possible means to address this problem and should be more thoroughly explored. These measures may be more possible than previously considered since local governments have made a renewed commitment to preserve riverside areas and the Corps of Engineers is in the process of reassessing Howard Hanson Dam's operations. ⑬ Second, if the major concern behind the alternatives which eliminate the Renton discharges from the river is the fisheries resource, then an option should be formulated which allocates the $110 to $198 million associated with tunnels to Puget Sound to a fisheries impact mitigation program. Such a program may even include the consideration of an exclusive fish passageway which is separate from all polluted water, whether Renton discharge related or not. ⑭

P-1 Drainage Channel

The Renton Treatment Plant layout as identified on page 64 of the Plan shows the P-1 drainage channel bordering the plant on the east and north boundaries. North of the plant the alignment of the P-1 channel has been modified and no longer follows the 300 foot property easement to the Black River pump station as shown. The channel now parallels the corridor of Springbrook Creek ⑮ northeasterly from the north boundary of the Renton Plant to a 25 acre holding pond immediately upstream of the pump plant. In this configuration, the permanent channel right-of-way has been reduced from approximately 300 feet to 210 feet in width. Some additional land next to the channel will be required temporarily for storage of excavated spoils from channel construction. Construction of the channel and pond in this area (e.g., pump station to I-405) is scheduled to begin in summer of 1982.

This design for the channel project eliminates potential conflicts with channel right-of-way and expansion of the Renton plant. If constraints to plant expansion were considered factors which reduced the desireability of Alternative A-1, or some variation, this change should be taken into consideration in the final EIS.

Seahurst Park

We do not agree with the statement on page 153 of the EIS that it is unnecessary to determine which alternative is "best" from a recreation perspective. To the contrary, determining the projects' impact on existing recreation facilities may clearly demonstrate a preference for one alternative over another. A case in point exists at Seahurst Park.

Seahurst Park is considered a model saltwater park that was designed and developed with Forward Thrust and state matching funds after lengthy debate with the community. The park has extremely high visitor use, particularly during summer months. A marine biology lab and fisheries facility of the Highline School District is adjacent to the park and diving reefs have been constructed by State Parks to promote near-shore scuba diving. Disruptive construction related impacts noted in the EIS for the Route A tunnel, highly sensitive geologic conditions, and effluent discharges in close proximity to swimming and diving beaches, are impacts that cannot be overcome by mitigation or enhancement efforts. We therefore recommend that the Seahurst tunnel and outfall alternative be eliminated from further consideration. ⑯

Planning for the Non Sewer Area

Metro's role in the non-sewer area is unclear. The plan recommends a program for local governments to follow; they are expected to collect information about water quality problems in the non-sewer area, and to meet with health departments to make decisions about actions to correct those problems. Local governments and health departments now have the authority to correct problems which they identify. What will Metro add to this system? Is a change in authority contemplated? ⑰

The recommended program for the non-sewer area raises questions about funding for on-site systems and programs. The Plan encourages experimentation with alternative wastewater technologies in the non-sewer area, but the EIS states that no funding is being

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sought at this time. Will Metro seek funding later to develop alternative technolgies which can be more cost-effective in low density applications? Is the plan a Step 1 '201' plan for the non-sewer area? How will the plan affect funding opportunities and priorities for alternative and innovative technologies for the non-sewer area?

Besides the major questions about Metro's role, the plan also raises questions about the relative costs and effectiveness of the recommendations for non-sewer areas. There are few facts included in the draft EIS to justify the recommended program. To what extent would each element of the recommended program for the non-sewer area contribute to water quality and public health? Which elements are essential and which are simply desireable? Do the recommended methods produce results which justify the costs? For example, what is the effect of regular septic tank inspection on preventing failures and preserving water quality? Does the effect justify the costs of mandating regular inspections? ⑱

The standards to be used for the "triggering mechanism" should be discussed in the final plan. What evidence of on-site problems or frequency of on-site failures will be considered significant enought to point to the need for action? ⑲

Energy Considerations

Since the preferred program requires more electricity per gallon of sewage than some of the other alternatives, the EIS should clarify what assumptions are made about future energy supplies and costs. Today's electricity prices do not necessarily reflect the price of future electricity, and future supplies of electricity are not as certain as present supplies. How were these facts incorporated into the selection of the preferred program? What measures can be taken to ensure future energy supplies, or to generate energy at the treatment plants? ⑳

Sensitive Areas

The EIS has noted that some of the planned facilities in the preferred program will cross wetlands, floodplains, and County agricultural districts. What techniques have been developed to insure that construction and growth impacts can be mitigated in these areas? Are Metro's project plans and facility routes flexible enough to change if the project-level environmental impact statements indicate that the adverse effects of construction and location of sewer facilities in these areas cannot be avoided? ㉑

Impacts to Surface Water Systems

The draft EIS properly notes the cause-effect relationship of sewers, increased development and surface water runoff. However, as witnessed in the case of the May Creek interceptor 201 project, this relationship and resultant impacts can be a major factor in project related decisions, timing, form of mitigation, and whether project-related EIS's are required. Therefore, stronger relationships between wastewater management and surface water management should be established along with parameters to help ㉒ identify in advance when wastewater project decisions will be particularly sensitive to surface water systems. In addition, since gravity sewer lines generally follow rivers and streams and must cross them, construction related and permanent impacts should be ㉓ identified.

We appreciate this opportunity to comment on the draft environmental impact statement. Decisions related to wastewater management will be some of most important for the region in terms of environmental consequences and financial burden. The manner in which the Environmental Protection Agency considers comments on the draft environmental impact statement, therefore, will directly affect how expeditously the decisionmaking process can move toward implementation. We look forward to the reponses to the issues and questions that we and others have raised and to continuing participation in programs to provide the best practicable wastewater management for our growing area.

Sincerely,

John M. Rose
Chairman, Environmental Impact Committee

JR:mm

cc: Jack Lynch, Planning & Community Development
Sheila Manus Vortman, Program Development Division
James Guenther, Public Works
Harold Robertson, Planning Division
John Nordin, Health Dept.
Jeff Bauman, Metro
Pete Beaulieu, PSCOG

Response to King County Letter of February 10, 1981

1-2. Only the proposed tunnel/outfall to Puget Sound and the Redmond connection-North Creek/Hollywood connection have been sized for 50-year flows.

The tunnel/outfall is sized to match the ultimate capacity of the Renton treatment plant, namely 144 MGD average flow and 325 MGD peak flow. The 50-year (2030) average flow for the Renton treatment plant is projected to be 146 MGD. The 50-year flow projection is based on a revision of population and flow estimates originally prepared for Metro's 1958 comprehensive plan. The Redmond connection and North Creek/Hollywood connection are similarly sized for the 50-year flow projected for their tributary areas.

The projected sewered population and sewered acreage is distributed among major drainage basins. Whether the additional growth will locate within current local service areas or within an expanded service area is a decision to be made by the appropriate land use agencies. Metro made no specific geographic assumptions about where the additional growth will locate.

Choosing the centralized alternative (A-3/A-5) does not foreclose the option of building a Kenmore treatment plant in the future. Metro analysis shows that about the year 2020, when the Eastside interceptor reaches capacity, a decision point will be reached where a Kenmore treatment plant should be considered. While it is not now cost-effective to construct a Kenmore treatment plant, the Renton 201 Citizen's Advisory Committee and others have suggested that Metro obtain a 40-acre site in the Kenmore area to preserve the Kenmore treatment plant option for the future. Additional information on sizing of nonmodular facilities is provided in Chapter 2 of Metro's Final Plan.

3. Changing land use plans may affect the timing of implementation of the modular elements of the recommended program but would not alter the major decisions being made for near-term improvements.

4. See General Response Number 15. Regarding the effects of "ability to implement" on project costs, see General Response Number 19 to PSCOG letter of January 8, 1981.

5. Additional information on construction timing and funding availability is presented in Metro's final Facilities Plan in Figures 3-10 and 3-11. Construction of all components of the project is estimated to begin in 1984 and be completed in 1986. Effects of possible project delays, from any cause,

on funding availability cannot be predicted at this time. However, both EPA and Washington State DOE intend that funding be provided only for a complete project that includes completion of all project components.

6. Additional detail has been provided regarding spoils disposal in Chapter 5 of the Final EIS. EPA will recommend that Metro develop a spoils disposal plan, as suggested by King County.

7. .See General Response Number 2.

8. The Renton treatment plant is a well run and well maintained facility. The existing plant began operation in 1965 and has never experienced a serious process upset. Like the existing facility, the expanded treatment plant will be designed with several backup and contingency measures to provide a high degree of reliability. Backup mechanical equipment, the resiliency of the secondary biological process, and enough primary capacity to isolate high strength "slug" flows are some of the contingency measures that will make a process upset or plant failure highly unlikely. In the unlikely event of a failure in the Renton plant secondary process, primary treated effluent would be temporarily discharged from the outfall, rather than secondary treated effluent. This would result in a decrease in plant performance from 90 percent removal of suspended solids and oxygen demanding materials (BOD_5) to about 30 percent removal of BOD_5 and 60 percent removal of suspended solids. Failure of the primary treatment process is extremely unlikely because of the mechanical simplicity of the system.

More sophisticated treatment levels are more prone to upset, raising the likelihood that effluent treated only to primary levels would be discharged, in this case to the Duwamish River, a more sensitive receiving water. Impacts in such an event would depend on timing, but could include fish kills and severe water quality standards violations.

9. See General Response Number 3.

10. Analysis in the Final EIS indicates that, although wedge dissolved oxygen may be slightly decreased by removal of Renton effluent, this negative effect is more than offset by the positive effects of removing Renton wasteloads from the Green/Duwamish River. Stream flow augmentation is an important beneficial use of effluent in the abstract, one which EPA policies support, but its benefits in the case of the Green/Duwamish River appear to be outweighed by the detrimental effects of wasteloads in the effluent on the river.

11. Land application of Renton effluent was considered for six decentralized plants in the Draft Plan, and was found to have few benefits justifying the increased costs. Large-scale land application was determined to be infeasible because of excessive land requirements.

12. See General Response Number 4b to U. S. Army Corps of Engineers letter and General Response Number 3 to PSCOG Letter of February 5, 1981.

13. See General Response Number 11 to Department of Game letter.

14. The Final EIS points out that fishery mitigation is not possible since hatchery capacity is not available. The cost of constructing a fish bypass channel would be similar to the cost of constructing the Alternative A-5 effluent pipeline along the Duwamish. Thus a fish bypass channel would be more expensive than the Seahurst Park tunnel. In other words, it does not really offer a cheaper solution to the problem. There are also questions about the technical feasibility of a fish bypass channel, including whether enough water exists for both the natural river channel and the bypass structure and whether all salmon and steelhead would use the bypass channel. The river would essentially become a conduit for Renton treatment plant effluent. Thus the resident fishery and the juvenile rearing habitat (anadromous) would be lost. This alternative would probably be unacceptable to DOE and Department of Fisheries.

15. The original channel alignment was not a constraint to treatment plant expansion.

16. Impacts of the tunnel/outfall construction at Seahurst Park have been described in further detail in Chapter 5 of the EIS. Although substantial short-term construction impacts will occur, as described in Chapter 5, no long-term impacts on beneficial uses of Puget Sound coastal waters are predicted, as discussed in General Response Number 2 and Chapter 6 of the EIS. Also see response to Highline Public Schools letter.

17. Metro sees its role in the nonsewer area as that of a regional agency seeking to solve water quality problems stemming from the inadequate performance of on-site wastewater systems. Information of septic system performance supplied by the Health Department will be coupled with Metro water quality data to identify areas where existing on-site system performance may be inadequate from a community wastewater management standpoint. By identifying these areas and providing a forum for key local agencies to discuss these wastewater disposal deficiencies, Metro hopes to resolve existing problems before on-site or community wastewater systems are no longer viable options.

Metro sees its role in this program primarily as a facilitator, with responsibility for on-site wastewater programs lying with local health and land use agencies. EPA has recommended that Metro take an active role in seeking implementation by land use agencies of needed recommendations for on-site systems.

18. See General Response Number 21 to PSCOG letter of January 8, 1981.

19. See General Response Number 4 to PSCOG letter of January 8, 1981.

20. Energy/chemical costs were one of the cost criteria used to evaluate alternatives. Metro also considered the effect of inflation, which disproportionately affects energy costs, on alternative ranking. Metro found that at inflation rates greater than 3 percent, the Seahurst Park alternative became cheaper than the Duwamish discharge alternative. Metro's recommended program calls for sludge digestion and methane recovery to produce energy at the treatment plant.

21. See General Response Number 6.

22. EPA agrees that growth-related surface water impacts of sewering decisions must be considered. The EIS provides an areawide overview of potential impacts. These impacts will be further considered in project-specific EISs and in Metro's proposed triggering mechanism.

23. Construction and permanent impacts of individual sewer projects on rivers and streams are best identified in project-specific EISs.

City of Bellevue Post Office Box 1768 · Bellevue, Washington · 98009

February 13, 1981

RECEIVED
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ENVIRONMENTAL EVALUATION BRANCH

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: Draft Environmental Impact Statement
Wastewater Management Plan for the Lake Washington/Green River Basins

Dear Mr. Mochnick

The City of Bellevue has reviewed the draft Environmental Impact Statement (EIS) for the Wastewater Management Plan for the Lake Washington/Green River Basins and appreciates the opportunity to comment. Our major concerns are the need to hold down the cost of service to users and have adequate wastewater management facilities, including interceptors pump stations and force mains available while maintaining and improving environmental quality. The following are detailed comments on the draft EIS and the companion draft plan related to these concerns:

SIZING OF NON-MODULAR FACILITIES

We recommend including in the plan a statement of policy that was discussed by Metro but which is not clearly stated in the Plan or EIS, namely: Facilities to serve future increased demands, such as interceptors, should be sized to accommodate long term needs where construction cannot conveniently be staged. ①

NEED FOR REGIONAL WATER RESOURCES PLANNING

On page 129 of the draft EIS, there is a statement that reads, "the DOE (1980) has recently adopted rules calling for minimum flows of 300 cfs. in the Green River at Auburn. Present low flows are about 200 cfs. There is not yet any clear agreement on how additional flows will be gained." This statement highlights the need for water resources management to be planned in the context of the three county needs related to water supply, flood control, and the treatment of sewage. To explain further, minimum flows in the Green/Duwamish River are affected by Howard Hansen Dam Operation and by the water supply needs of the City of Tacoma, and other municipalities. Also, flood control ponding proposed in the Green River Valley might conceivably be used to store treated effluent from the Renton plan during river low flow periods and discharge during higher flow periods. Therefore, by coordinated planning for increasing actual low flows in the river and discharging less effluent the reasoning behind the overruling decision by Metro to get the effluent out of the river might be changed. ②

City of Bellevue offices are located at Main Street & 116th Avenue S.E.

We contend therefore that before going ahead and spending hundreds of millions of dollars on wastewater management improvements, all water resource management needs should be addressed in a composite program of most benefit to the residents of the three county areas.

MIDDLE GROUND TREATMENT METHODS

In the draft EIS the proposed methods of treating wastewater range from sophisticated advanced treatment methods before discharging effluent into the river to secondary treatment and discharging treated waste into Puget Sound. Both of these options would be very expensive to implement. The draft EIS does not and should address, middle ground solutions which might incur less cost at the Renton plant, e.g., storing treated affluent in a holding reservoir during river low flow seasons and subsequent controlled discharge into the river when flows are higher. ③

METRO SYSTEMWIDE ALTERNATIVES

In using the "building block" approach of meeting future needs by building modular waste management units, Metro has considered the Renton Treatment Plant and the area served by it in isolation. The other treatment plants which are located on Puget Sound were covered under a separate 201 plan and have not been considered in this latest plan for the Renton Treatment Plant. Therefore, planning to meet the needs of the Metro served area has not been done in the most cost effective way. It is recommended that the alternatives of not closing Alki Point and Carkeek Plants should be reviewed in the EIS since with this option the West Point Treatment Plant could take waste diverted in the proposed plan to Renton via the Redmond connection and therefore reduce costs. ④

COST OF ENVIRONMENTAL PROTECTION

The detailed impact of future discharge into either the Sound or the Duwamish River and the benefits of costly mitigation of "harmful" effects are not well covered in the EIS. The specific environmental benefits such as protection of fish runs and recreational shellfishing are not that apparent in the EIS. Since protection of these resources could result in the expenditure of millions of dollars, additional documentation would seem important. The data base available on the Sound and used in the EIS is limited to information about the West Point outfall; the significance of heavy metals in the Duwamish River discharge awaits the completion of a Toxicity Study; and the sludge management method finally to be adopted will not be known until another study ends. In short the EIS should tell us what we are buying with these expensive facilities and processes in more specific terms. ⑤

DUAL PLANT ARRANGEMENT BENEFITS UNDERPLAYED

Alternative B1 which is a dual treatment center alternative, whereby the Renton Plant will continue to serve the existing Renton service area and a new Kenmore Treatment Plant will serve the north part of the study area currently tributary to West Point, is not considered in the EIS with respect to the important operational benefit of having multiple plants rather than one single plant serving the Renton area. Another advantage of the dual plan is that ⑥ both plants, Renton and Kenmore, would be capable of expansion in the future thus increasing the options for serving a larger wastewater management demand should one arise.

TRIGGER MECHANISM NEEDS INSTITUTIONALIZING

The so called "triggering mechanism" which is to act as a timing device to aid in the implementation of the modular elements of the long term program to meet the needs of future growth and changes in water quality and wastewater flows is assumed to be the responsibility of the agencies which have land use control in any particular geographic segment of the Metro served area. We agree with the comments made in the letter in response to the draft EIS from the Puget Sound Council of Governments that local inaction in dealing with water quality issues identified through the triggering mechanism or other means can take the decision making on how to plan and implement incremental waste treatment facilities away from local government. We recommend therefore that the institutional aspects of the so called triggering mechanism be worked out in detail in advance so that responsibilities and a method of coming together for decision making is already in place before the event. Thus, the 201 plan should include a management system including procedures or formal agreements to insure that the necessary monitoring activities are considered and that affected jurisdictions meet together periodically to review the need for updating Metro plans. ⑦

FISCAL IMPACTS TREATED SUPERFICIALLY

The fiscal impact of the alternative plans are not considered in the draft EIS in nearly the same depth as the environmental impacts. In order to provide equitable distribution of costs there should be an allocation of costs and of system capacity to indicate the amount that is set aside for each recognizable jurisdiction. This will make it possible to compute what additional costs could be allocated to future users of the Metro system outside the current sewered area. In this way it would be possible to determine the allocation of costs for new developments that could be made in order to insure an equitable contribution by these new users to the Metro system as a whole. ⑧

Finally, we would compliment Metro, EPA and the authors of the EIS on a thorough and professional job.

Sincerely

Diane T. White

Diane T. White
Environmental Coordinator

9060C/SE

Response to City of Bellevue Letter of February 13, 1981

1. See General Response Number 1 to King County letter.

2. See General Response Number 3.

3. See General Response Number 4b to U. S. Army Corps of Engineers letter and General Response Number 3 to PSCOG letter of February 5, 1981.

4. Metro's recommended program has incorporated this system-wide cost-effectiveness approach.

5. Additional documentation of the benefits and impacts of Metro's recommended program has been provided in the Final EIS. The value of the Green/Duwamish River fishery to be protected by the recommended program is now estimated to be over $10 million annually. Additional data have also been provided regarding Puget Sound and Green/Duwamish River impacts of the recommended program. It is true that Metro's toxicant study and sludge management plan will not be completed until after a decision regarding the wastewater management plan is made. However, adverse impacts on the Green/Duwamish River will occur if a decision is delayed for several years, and results of these studies are unlikely to modify decisions regarding expansion of the Renton plant and discharge location for Renton effluent.

6. The flexibility of a Kenmore plant is recognized in the section of Chapter 6 of the Final EIS related to growth impacts resulting from project staging.

7. See General Response Number 4 to PSCOG Letter of January 8, 1981.

8. Metro is undertaking additional work to fully address these questions. Preliminary results show that for all classes of users (residential, commercial and industrial) about one-third of the capital costs of the recommended long-term program for the Renton system are for existing customers. The remaining two-thirds of the capital costs are for facilities to serve future customers. About 5 percent of the capital costs are assigned to existing industries and 11 percent of the capital costs are assigned to future industries.

The operation and maintenance costs are generally proportional to the demand on the treatment plant. Because new customers are charged the same as existing customers, overall there will be no subsidy of the increased operation and maintenance costs due to growth. Similarly, the high strength and high volume surcharge for industrial users helps ensure that industrial users pay their fair share of these costs.

METRO
Municipality of Metropolitan Seattle
Exchange Bldg. • 821 Second Ave., Seattle, Washington 98104

RECEIVED
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ENVIRONMENTAL EVALUATION
BRANCH

February 17, 1981

Mr. Roger K. Mochnick
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue, M/S 443
Seattle, Washington 98101

Dear Mr. Mochnick:

Metro staff has reviewed EPA's Draft Environmental Impact Statement (EIS) on Metro's Draft Wastewater Management Plan for the Lake Washington/Green River Basins. Throughout the planning process, both EPA staff and the EIS consulting team have done an excellent job in coordinating the preparation of the DEIS with the Draft Wastewater Management Plan. We appreciate your commitment to this cooperative approach as well as your success in meeting deadlines to complete the Draft EIS on schedule. The Draft EIS, when finalized, will undoubtedly be a helpful tool for Metro Council decision makers in evaluating the Metro staff recommended program, the alternatives considered, and the implication of taking no action.

① During this public review period, we have routinely forwarded numerous technical and editorial corrections/comments to your staff. We anticipate that the Final EIS will respond to these items. The only additional comments we have relate to Chapter 7 of the Draft EIS, "Alternatives Available to EPA." We ask that you consider the implications of the potential grant conditions discussed in that chapter. Some of the grant conditions could be fully implemented under Metro's existing authority. Others (specifically those related to "secondary impacts") pose a question as to whether Metro has the ability or authority for effective implementation. It is not clear how these types of potential grant conditions relate to the federal regulations requiring that Metro must have the necessary legal and institutional resources available to implement the facilities plan (CFR 35.917.1, Section h). Perhaps the best way to address these types of potential grant conditions is to identify, in the Final EIS, the governmental agencies with authority for implementation.

We look forward to your continued cooperation in preparing the Final Facility Plan and EIS.

Sincerely,

Rodney G. Proctor

Rodney G. Proctor, Manager
Environmental Planning Division

RGP:khj
cc: Mr. Bob Kievit, EPA
Ms. Rosemary Walrod, DOE
File

Response to Metro Letter of February 17, 1981

1. Grant conditions have been developed in more detail in the Final EIS. The proposed grant conditions are considered by EPA to be within Metro's legal authority.

CITY OF NORMANDY PARK

240 S.W. 200TH
NORMANDY PARK, WA 98166
TELEPHONE (206) 824-2602

February 17, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Gentlemen,

At its regular meeting on February 12, 1981, the City Council of the City of Normandy Park adopted a resolution in opposition to the alternatives proposed for solution to problems revealed in Metro's Wastewater Mangement Plan (Renton 201 Study).

We are enclosing that resolution as confirmation of the grave concerns and firm opposition of the City relative to possible use of south Puget Sound as receiver of effluent from Renton and other areas east and north of Lake Washington.

The City of Normandy Park and Southwest Suburban Sewer District are, of choice, not a part of the Metro system. We acknowledge the outstanding job done through implementation of that system to address the previous problems in Lake Washington. However, we fail to see how resolution of the problems that continue or are projected for areas of Renton and north and east of Lake Washington should suddenly be imposed on the areas of south Puget Sound at the expense and adverse impact of its residents and water quality of south Puget Sound. ①

We request that this letter and its accompanying resolution be made a part of the record in opposition to Alternative A-3 of Metro'd Draft Wastewater Management Plan (Renton 201 Study).

Sincerely,

Margaret C Lane

Margaret C. Lane
City Manager

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FEB 20 1981
ENVIRONMENTAL EVALUATION BRANCH

CC: Puget Sound Governmental Conference
Office of Senator Henry Jackson
Office of Senator Slade Gorton
Office of Congressman Mike Lowry
Councilman Paul Barden, Chairman, King County Council
Edward B. Sand, Building & Land Development, King County
City of Tacoma; Pierce County Land Development Department

RESOLUTION NO. 374

A RESOLUTION OF THE CITY OF NORMANDY PARK AUTHORIZING THE PREPARATION AND RELEASE OF A LETTER FROM THE CITY MANAGER TO ENVIRONMENTAL PROTECTION AGENCY, REGION X, AND TO THE METRO COUNCIL, EXPRESSING THE CITY'S FIRM OPPOSITION TO ALTERNATIVE A-3 OF METRO's DRAFT WASTEWATER MANAGEMENT PLAN (RENTON 201 STUDY).

WHEREAS, the City Council of the City of Normandy Park has reviewed and duly considered the Draft Plan and Draft Environmental Impact Statement for the Metro Wastewater Management Study for Lake Washington/Green River Basins (also known as the Renton 201 Study), as available in both complete and summary formats, and as presented by Metro representatives at a public meeting with the City Council and Southwest Suburban Sewer District Commissioners on January 27, 1981, and

WHEREAS, as a result of that above noted review and consideration, the City of Normandy Park has the following concerns relative to each and all of the three potential routings for Alternative A-3 of the Draft Plan:

1. There is no assurance that the long-term cumulative effects of such high volume of effluent discharge would not adversely affect the environment of Puget Sound, particularly from the point of the proposed discharge southward. Specifically, this concern relates to:
   a) Contamination of the shoreline of the City of Normandy Park, as well as that of its Planning Area or "Sphere of Influence" which, as defined in the City's Comprehensive Plan, includes the Three Tree Point or Point Pulley area. 2
   b) Water quality of Puget Sound as it moves south through the narrow passage between the coastlines of the City of Normandy Park and the City of Des Moines (with its fishing pier and jetty) and Vashon Island.
   c) Water quality of Commencement Bay in Tacoma, which is already experiencing severe pollution to fish life due to industrial contamination.
2. The full impact, both ecologically and financially, of tunnel construction to the Point Pulley area has obviously not been given proper consideration. The pre-selection of sites without engineering data to determine costs exposes the agencies, local government & citizens to high cost overruns. 3
3. Our local waters are not currently receiving heavy metal contamination; however, such contamination would occur under the proposed Plan. The EIS acknowledges that a study of the effects of such contamination is not complete. 4
4. The plan is projected on a 20-year growth of the Lake Washington Green River Basin areas, but ignores the fact that our local area will also grow and need to address its own growth problems, including sewage disposal. 5
5. It is not acceptable to provide for local water quality studies "after the fact". If it is contemplated that the outfall discharge would be at Pulley Point or at Alki, full flow studies must be made of the entire affected Puget Sound basin to determine the long-term effect of such quantities of effluent. 6
6. There appears to be a conflict of interest in that the EIS for the proposed project has been prepared by the EPA. This latter organization is the agency chartered to review and approve an EIS on behalf of the public. How, then can the same agency, working with Metro, also assume responsibility to provide objective criticism? 7

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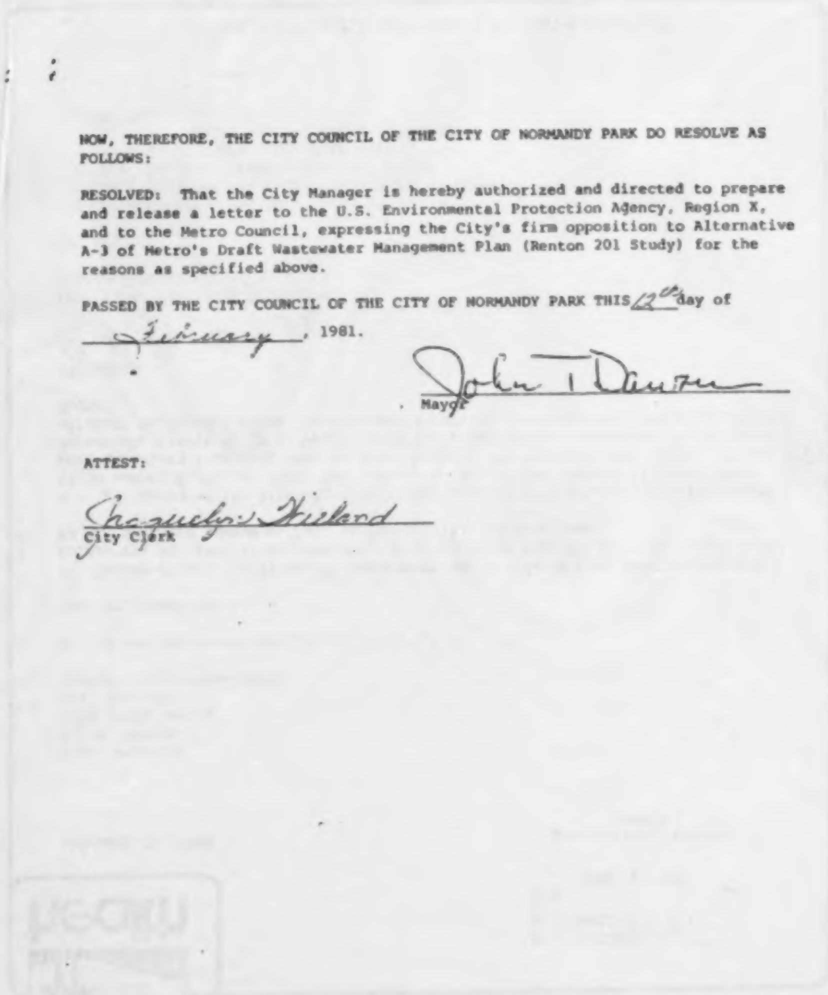

NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF NORMANDY PARK DO RESOLVE AS FOLLOWS:

RESOLVED: That the City Manager is hereby authorized and directed to prepare and release a letter to the U.S. Environmental Protection Agency, Region X, and to the Metro Council, expressing the City's firm opposition to Alternative A-3 of Metro's Draft Wastewater Management Plan (Renton 201 Study) for the reasons as specified above.

PASSED BY THE CITY COUNCIL OF THE CITY OF NORMANDY PARK THIS 12th day of February, 1981.

John T Dawson
Mayor

ATTEST:

Jacquelyn Wieland
City Clerk

Response to City of Normandy Park Letter of February 17, 1981

1. The Final Plan recommended program delays a decision on whether flows from the north part of the study area will be diverted to the Renton plant.

While Metro's jurisdiction includes all of King County, Metro's enabling legislation allows Metro to provide service outside King County by contract with local agencies. There are local sewerage agencies within King County which are not part of the Metro system, e.g., Vashon Island, southwestern King County, and cities in the Snoqualmie Valley.

The Metro facility planning area includes those areas within the Lake Washington and Cedar/Green River basins which are physically tributary to Metro treatment plants. The Renton study area is that eastern portion of the planning area designated in Metro's comprehensive sewerage plan which could flow to the Renton treatment plant for treatment and disposal.

If diversion to Puget Sound is a part of a final facilities plan, approved by EPA and the Washington DOE, Metro could then design and construct the tunnel and outfall to Puget Sound even if the tunnel/outfall were located in an area not served by Metro. Metro would, of course, have to secure the appropriate easements and permits regardless of the route selected.

2. See General Response Number 2.

3. See General Response Numbers 7, 11, and 15.

4. Heavy metals occur in virtually all portions of central Puget Sound from a variety of point and nonpoint sources. Metro is presently conducting a study of sources, fates, and control measures for toxic substances, including metals, for all Metro wastewater treatment plants.

5. There is no obvious relationship between selection of a wastewater management plan for the Renton study area and meeting the sewerage needs of the Normandy Park area. If the assumption is that Puget Sound has a highly limited assimilative capacity for wastewater that future discharges from the Normandy Park area would completely utilize, there is no evidence to support this idea.

6. See General Response Number 15.

7. See General Response Number 13.

health

Charles M. McGill, M.D., M.P.H., Acting Director of Health

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FEB 23 1981
ENVIRONMENTAL EVALUATION
BRANCH

February 20, 1981

Roger Mochnick
E.P.A. Region X
1200 Sixth Avenue
Mail Stop 443
Seattle, Washington 98101

RE: Metro Wastewater Management Draft E.I.S.

Dear Mr. Mochnick:

The Tacoma-Pierce County Health Department would like to take this opportunity to express its general concern about water quality impacts upon the Tacoma area by the proposed sewage outfall at Point Pulley in King County.

A brief review of the literature available coupled with discussions with several state agency employees indicates that up to 90% of the treated effluent would move southward into this area of Puget Sound. The Tacoma-Pierce County Health Department wishes to go on record with the recommendation that the discharge of effluent be located where flushing would rapidly discharge the sewage out of the Sound. ①

Sincerely,

C. M. McGill

Charles M. McGill, M.D., M.P.H.
Acting Director

CMM:bjh

cc: Mike Parker, Chairman, Board of Health
    Jack Bujacich, Vice-Chairman, Board of Health
    Joe Stortini, Member, Board of Health
    Jack Hyde, Member, Board of Health
    William Chunyk, Member, Board of Health
    METRO

TACOMA-PIERCE COUNTY HEALTH DEPARTMENT

3629 SOUTH D ST. TACOMA, WASHINGTON 98408

Response to Tacoma-Pierce County Health Department Letter of February 20, 1981

1. See General Response Number 1.

Your City, Seattle

Office of the Mayor
Charles Royer, Mayor

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FEB 26 1981
ENVIRONMENTAL EVALUATION
BRANCH

February 23, 1981

Mr. Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U. S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Mochnick:

Thank you for the opportunity to review the draft Environmental Impact Statement on the Metro Wastewater Management Plan for the Lake Washington/Green River Basins. Please consider the comments below and give us your responses in the Final EIS:

- We understand that some significant revisions are being proposed to both the adopted plan for the Puget Sound plants and the preferred alternative for the Renton Plant. These would include not abandoning Alki and Carkeek, not diverting the North Lake Washington flows from the West Point system, construction of a parallel Kenmore interceptor, construction of combined sewer overflow controls to offset the additional flows from North Lake Washington and deleting the proposed Duwamish plant. We would appreciate an opportunity to review and comment on the revised proposal prior to adoption of a final plan. ①
- The DEIS does not adequately discuss the current and anticipated water quality problems in the Duwamish River. These problems are not presented in quantitative terms relative to water quality standards (i.e. ammonia levels, dissolved oxygen levels). Yet this forms the basis for proposals to move the outfall from the river to Puget Sound or to increase the level of treatment. Studies which have been done on dissolved oxygen, ammonia, and other issues should be cited. ②
- Even with the higher level of treatment proposed under Alternative A-1 (secondary with nitrification), some water quality problems will persist as a result of the continued discharge to the river. We feel there should be some discussion added to the EIS comparing these water quality problems with the reliability of the various treatment processes proposed. ③
- The DEIS recommends that a Redmond Connection and a North Creek/Hollywood Connection be built to shift a portion of the West Point service area to Renton. The capital cost of these connections is $39 million. The energy cost of additional ④

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City of Seattle—Office of the Mayor—12th Floor Municipal Building, Seattle, Washington 98104 (206) 625-4000

pumping caused by the shift is estimated at 25 million kwh/year. The magnitude of these costs requires considering other portions of the West Point service area for transfer to Renton. Specifically, transferring a portion of the proposed Duwamish Treatment Plant service area should be evaluated.

- One of the alternatives identified in the Draft EIS on the Renton Facility Plan is to continue to discharge into the Green/Duwamish River system, but to go to a higher level of treatment (secondary with nitrification). Some water quality problems will continue to persist as a result of this discharge to the river. Some discussion should be added to the final EIS comparing these water quality problems with the reliability of the various treatment processes proposed. ⑤
- Alternative A-5 (Alki discharge) is more expensive by $78 million than A-3 (Point Pulley discharge). What are the quantifiable benefits associated with that additional cost? If these benefits are associated with some element of the plan for the Puget Sound treatment plants, then that relationship should be discussed and the benefits described. ⑥

Sincerely,

Charles Royer

Charles Royer

CR:lls
cc: Margaret Fleek
Bill Stafford
Jim Kamihachi

Response to City of Seattle Letter of February 23, 1981

1. The final plan recommended program has deferred the decision on diversion of flows from the north part of the study area to the Renton plant. The additional matters discussed will be addressed in the Final Plan and EIS for Metro's Puget Sound plants.

2. See General Response Number 3.

3. The Final EIS points out that the nitrification process can be difficult to initiate and maintain. An analysis of the effects of nitrification process upset has been added to the Final EIS.

4. Metro's final plan recommended program has deferred the decision on construction of the Redmond and North Creek/Hollywood connections.

5. See General Response Number 3.

6. See General Response Numbers 2 and 9.

THE RENTON CITY COUNCIL

MUNICIPAL BUILDING • 200 MILL AVENUE SOUTH • RENTON, WASHINGTON 98055 • 235-2586

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ENVIRONMENTAL EVALUATION BRANCH

February 18, 1981

Mr. Jeff Bauman
Municipality of Metropolitan Seattle
Exchange Building
821 Second Avenue
Seattle, WA 98104

Dear Mr. Bauman:

Subject: Renton 201 Facilities Plan

Pursuant to our discussion on February 5 with Mr. John Lesniak of Metro concerning the Renton 201 Study, we offer the following comments on the Draft Plan. We are concerned about the treatment of solids at the Renton Treatment Plant. Any significant stockpiling of solids or emission of objectionable odors would be unacceptable impacts and should be addressed in the Final Plan. Likewise, the ultimate disposal of processed solids must be examined. ①

We are also concerned that the real proportion of additional facilities costs attributable to commercial and industrial development be charged to these users rather than to residential users. The Final Plan should include a breakdown of anticipated service charges for various types of users. ②

Thank you for the opportunity to review this Draft Plan. Should you have any questions, please contact this office.

Sincerely,

Richard M. Stredicke

Richard M. Stredicke
President, Renton City Council

GW:bd
cc: Roger K. Mochnick, EPA

Response to City of Renton Letter of February 18, 1981

1. The solids processing facilities at the Renton plant will be operated in such a way as to minimize odor impacts. As to ultimate solids disposal, see General Response Number 5.

2. See General Response Number 12.

ORGANIZATIONS

CITIZENS COMMITTEE FOR CLEAN WATER

107 SOUTH MAIN, SEATTLE, WA. 98104 / 623-1483

January 21, 1981

Mr. Roger K. Mochnick   M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

This letter contains the comments of the Citizens Committee for Clean Water on METRO'S Wastewater Management Plan for the Lake Washington/Green River Basins. It is based on data in EPA'S (Region 10) Draft Environmental Impact Statement and in METRO'S Draft Plan Summary of its Wastewater Management Study for Lake Washington/Green River Basins (Renton 201 Study). Both documents are dated December 1980.

We concur in expansion of the existing Renton secondary treatment plant and with the discharge of its effluent through a forced main, tunnel and new outfall in Puget Sound off Alki Point. This plan has been designated A-5 and is essentially identical with the Renton portion of METRO'S Preferred Facility Plan (PFP). The latter plan was recommended by METRO'S Executive Director, Mr. Neil Peterson, to the METRO Council on August 17, 1978. For this reason Plan A-5 is capable of being integrated into METRO'S planning for the Duwamish treatment plant and therefore would be able to share in the cost of the needed new deep water outfall in Puget Sound. Plan A-3 does not have this capability and would require a separate outfall for the Duwamish plant, thus inordinately increasing the cost of an urgently required facility to process our industrial wastes. ①

We would also welcome the decentralization inherent in Plan B-1, which assigns 25% of the Renton service area to a new plant in the kenmore area. Centralization of sewage treatment plants can precipitate major environmental disasters when plant failures occur-- and unfortunately failures can and do occur. ②

We do not concur with that portion of Plan B-1 that calls for discharging treated wastewater into the Duwamish River. This important anadromous fish producing river already carries too many pollutants for the continual preservation of its salmon resources. ③

We also are opposed to its obvious lack of coordination or integration with METRO'S planning for a Duwamish treatment facility.

We are concerned that the cost of the Phase 1 expansion of the Renton plant has increased well beyond the recorded inflation rate for construction and justifies a review by our elected officials, beyond what is possible at workshops and public hearings. ④

contd.

Following is a summary of METRO's old and new cost figures:

	METRO's PFP August 1978 (millions)	METRO's Plan A-5 Dec. 1980 (millions)	% Change
Renton Phase 1 Expansion	$34.3 M	$74.8 M	118%
Force Main, Tunnel Alki Outfall	83.5 M	240.3 M	188%
Standard Engineering News-Record Construction Cost Index (C.C.I.)	3000	3500	17%

- - - - - - - - - - - -

That portion of the EIS concerned with the growth-related impacts of the alternatives has not addressed cost-sharing among METRO rate payers. As we understand current procedures, the costs of METRO's Wastewater Management Plan for Lake Washington/Green River Basins will be allocated equally to all current and future rate payers. This will be done regardless of where rate-payers live and regardless of the extent to which they have already amoritized the cost of the facilities they have been and are using. What needs to be addressed in the EIS to facilitate its use as a decision document are the growth consequences of requiring growth areas to pay all, or at least a larger proportion of, the costs associated with handleing their sewage.

We do not assume to know where equity lies in this matter and we expect that it will be resolved, as it should be, in an appropriate political arena. But we do know that the citizens of Seattle and its northern and southern suburbs will have to assume a substantial burden just in upgrading their own treatment facilities-- with or without the participation of rate payers in the Renton service area. An addition to this burden of a rate increase that is essentially a subsidy to the development of east-side open spaces appears to be an impact that should be displayed in the EIS, discussed at the workshops and addressed at the public hearings. ⑤

There are approximately 65,000 house holds in the Renton service area, presently on septic tanks. They have contributed nothing for costly water quality but receive the benefits from METRO's programs. They could be accused of contributing to the degradation of water quality.

We recognize that an approach to equity could be achieved if METRO's Plan provided improvements to water quality in Puget Sound opposite the City of Seattle and its northern and southern suburbs. IT DOES NOT.

METRO's request for a waiver from secondary treatment for its Puget Sound plants, means that the noxious character of 80,000 lbs of suspended sewage solids will continue to be discharged into Puget Sound every 24 hours. If granted this discharge could be continued for another five years and renewed at the end of that time. Source control of both heavy metals and toxicants has not yet been initiated and in any case will have little effect on domestic sources. ⑥

contd.

Mr. Roger K. Mochnick
January 21, 1981
Page 3

Our final concern relates to the cost consequences of the time already used by METRO in planning and studies. The current phase of METRO's planning began in 1970 with the RIBCO effort. A METRO report was published in December 1974 as part of this study (Part III, Water Quality) and recommended expansion of the Renton plant and upgrading to secondary treatment of METRO's plants at West Point, Carkeek, Richmond Beach and Alki, all at a 1973 cost of $159,050,000. including second phase expansion costs to 1990. See pages 116 and 117 from The Construction Cost Index - 1763, 1973 Engineering News Record; plant capacity of the system was 449.5 mgd.

⑦

In August 1978 the Construction Cost Index had increased 70% to 3000. However, METRO's estimated cost for its August 17, 1978 Preferred Facility Plan with 100% secondary treatment had increased by 224% to $514,000,000. Plant capacity was 222 mgd inclusive of a new plant at Duwamish that would phase out Alki.

Twenty-eight months later, the Renton portion, (Plan A-5) of the August 1978 Preferred Facility Plan had increased from $117,800,000. to $315,000,000.--up 167% even though the Construction Cost Index had risen only 17% to 3500.

We do not know why METRO's cost estimates, coupled with the usual refinements in planning or design, have consistently outstripped an inflation rate that is regarded in many quarters as disastrous. What can rate payers expect [illegible] when the needed work actually is advertised for bids?

We ask most sincerely; Is METRO taking the tax payers of King County down the same path as the Washington Public Power Supply System?

Ten years of planning has taken place without METRO having upgraded any of its treatment plant discharges into the Duwamish River or Puget Sound, but with astronomical increases in the estimated construction cost of mandated facilities. Under these circumstances we suggest EPA cease financing METRO's planning efforts and direct immediate action to achieve early compliance with Federal Law and METRO's own enabling legislation. From the results to date, additional planning can only result in cost increases well in excess of current inflation with the distinct possibility of the needed and required sewer system costing more then the taxpayers can afford.

However, we recognize that the 10-year planning effort, coupled with the public involvement financed largely by EPA, has told us what needs to be built, and where. Reasonable alternatives have been proposed that employ METRO's preferred facility configuration and which defer upgrading to 100% secondary for another 30 to 35 years. We made such a recommendation two and one half years ago. Let's get on with the job while it is still possible to pay for it and also improve water quality in Puget Sound.

Yours very truly,

Thos. O. Wimmer

Thos. O. Wimmer,
Citizens Committee for Clean Water

C.C. Mayor Charles Royer
Governor John Spellman
Seattle City Council
King County Council
Mr. Donald P. Dubois, EPA
Mr. John Spencer, DOE

Response to Citizens Committee for Clean Water Letter of January 21, 1981

1. See General Response Number 9. Also, see Response Number 7 to PSCOG letter of February 5, 1981.

2. The Final EIS recognizes the flexibility provided by Alternative B-1, and the construction of a Kenmore plant is not precluded by the final plan recommended program.

3. No response required.

4. Metro believes the cost estimates presented in the final plan are generally accurate plus or minus 20 percent.

5. It might be assumed that charges to new residents in the Metro service area would increase if they bore the full cost of expansions of the core treatment system. However, it is impossible to determine what, if any, impacts this might have on land use patterns in the service area.

6. In a sense, on-site users already help pay to protect water quality. They pay federal taxes which support Metro's facility planning and 208 functions through the Clean Water Act grant program. As state residents, they also contribute to the Referendum 39 grant program. Whenever on-site users have their septic tanks pumped, part of the charge covers the cost of treating the septage at the RTP. It should also be noted that the cost of installing and maintaining a septic tank system is borne by the local user. In these ways on-site users are paying to protect public health and water quality.

7. The cost differences result from elements of the plant expansion and Alki force main, tunnel and outfall that were not part of the 1978 Puget Sound Facilities Plan. Specifically, Renton plant expansion from 36 MGD to 72 MGD was estimated in 1978 as $53.8 million, not $34.3 million ($34.3 million was expansion from 48 to 72 MGD). A CCI increase from 3,000 to 3,500 increases this to $62.8 million. The Renton Facility Plan includes a plant expansion cost of $74.8 million. The $12 million increase over $62.8 million results mainly from sludge processing facilities not considered in the earlier plan. The Alki outfall was estimated in 1978 to cost $83.5 million, increasing with the CCI to $97.4 million. The $240.3 million cost estimate for the Alki outfall in the Renton plan results from the need for pump stations and force mains rather than gravity flow, and the need for a 144-inch diameter rather 120-inch diameter pipe, deeper trenching, trench sheet

piling construction, stabilization and well point dewatering. These identified needs resulted from detailed analysis in the Renton plan, including hydraulic profile, soils review, utility conflicts and groundwater levels.

CITIZENS FOR CLEAN WATER

107 SOUTH MAIN, SEATTLE, WA. 98104 / 623-1483

February 16, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

The enclosed comments reflect some of the areas of concern by the Citizen's Committee for Clean Water of the DEIS for the Wastewater Management Plan for the Lake Washington/Green River Basis (Renton DEIS). We have stated our position on this issue at one of the public hearings.

We have repeatedly voiced our concern for the inadequate public involvement of this and previous plans. It now appears that another alternative, called A3', is being considered. This new plan is not merely a slight modification of A3, but an attempt to make the price tag more palatable by delaying needed facilities for the next generation. We would expect the A3' plan to be discussed in public hearings before it is included in the final EIS. ①

Metro's role in water quality management is not totally clear. On the one hand, Metro claims to provide only a "wholesale" sewage treatment service. On the other, Metro is actively engaged in water quality activities, such as milfoil removal and fish enhancement. If Metro is, in fact, a super-sewer district then they should let another agency manage water quality. If Metro is the water quality manager for the Seattle area, then the cost of sewage treatment should not influence water quality decisions. This conflict in roles is not in the public interest. ②

Sincerely yours,

Scott Smith

Scott Smith

RECEIVE
FEB 17 1981
ENVIR

DEDICATED TO THE IMPROVEMENT OF WATER QUALITY AND
BETTER MANAGEMENT FOR WATER RESOURCES

RENTON DEIS COMMENTS:

If the existing Renton treatment plant is expanded to 99 MGD, when will the expected population growth require the next phase of expansion? What will happen when the Renton site reaches its 144 MGD limit and further expansion is necessary? ③

Of the 40 component agencies in the Renton study area, what is the severed and non-severed population within each agencies boundries? ④

How does EPA determine if a proposed project is "innovative and alternative" to receive 85% federal funding? Which, if any, of the proposed alternatives would so qualify? How would this additional federal funding affect the estimated sewer charges? ⑤

It appears from the projected monthly sewer charges (table 3-3) that many of the alternatives differ by only a few pennies. At what relative rate will monthly costs of each of the 15 alternatives likely increase with time? Is it possible for a low sewer charge alternative to be more expensive in the long-term? What would happen to the sewer charge if only the residents of the Renton service area paid for that plant's expansion? ⑥

"Metro considers the purchase of...(5000 acres)...within a growing metropolitan area to be infeasible." Is this a Metro staff decision or a policy of the Metro Council? What would be the cost of such land aquisition? What type of treatment would such effluent receive prior to entering the lagoon? What type of land would be required for spray irrigation and storage lagoons? ⑦

What types of satellite pretreatment has been considered, and what are the range of costs? Has any form of "in-pipe" treatment been considered? ⑧

In the "no-project" alternative, at what point would a sewer moratorium be imposed? Which agency has the authority to impose such a moratorium? If the Renton treatment plant is currently operating in a "stressed mode", and it will be several years before any capacity expansion project is completed, why is not a moratorium already in existance? When did Metro first predict reaching plant capacity at the Renton treatment plant? Why is this planning process taking place AFTER the plant reached the stressed mode? How much is the daily fine for violation of the discharge permit? ⑨

Table 3-5 implies no negative impact on fisheries/shellfish protection from any of the alternatives. Does this mean that shellfish on Seattle beaches will no longer be contaminated? What Puget Sound plans are being used to establish compatibility with each alternative? What weighting factors were assigned to the various criteria? ⑩

How much of the methane gas is expected to be utilized at the plant? How much less methane will be produced at West Point as a result of local sludge digestion at Renton? What will happen to any excess methane? Is there a cost savings in trucking sludge from Renton as opposed to West Point? ⑪

How do the costs of these alternatives compare with those predicted in the Preferred Facilities Plan and other planning efforts, including the RIBCO Studies? What are the reasons for differences? ⑫ How much has been spent on 201/208 related studies by Metro since 1972? ⑬

Table 3-10 compares the costs of sludge disposal systems. What benefits might be returned to local and state taxpayers from each of the options? ⑭

Response to Citizens Committee for Clean Water Letter of February 16, 1981

1. The A-3 alternative is identical to the program recommended in Metro's final plan. This alternative is evaluated extensively in the Final EIS, and it will be the subject of additional hearings.

2. Metro's enabling legislation gives Metro the responsibility for water pollution abatement functions. Metro believes its sewage treatment and areawide water quality responsibilities are fully consistent with Metro's mandated function. Metro bases this on DOE's designation of Metro as the areawide water quality agency (208) for the Cedar/Green River Basins.

3. The Renton facility plan has a 20-year horizon. Beyond that point in time additional planning will be necessary to define exactly what long-range configuration would be most cost effective. At this time, it appears that, based on a 50-year horizon, a Kenmore treatment plant might be cost effective near the end of the 50-year planning horizon.

4. The population projections utilized for the Renton study were prepared by PSCOG and are disaggregated by subdrainage basin or AAM district. To provide sewered and unsewered estimates of population by component agency would require additional work by PSCOG.

5. EPA determines qualification of facilities as "innovative or alternative" on the basis of reclamation and reuse of water, recycling, energy recovery, and other such achievement of benefits. Metro has proposed several project components that may qualify, such as certain sludge handling and disposal facilities, heat recovery facilities, and septage handling facilities. If specific projects qualify for 75 percent federal funding and also qualify as innovative or alternative, an additional 10 percent funding is available. This would reduce the necessary local share and resulting increases in sewer charges.

6. The present worth analysis allows an equal comparison of alternatives with different staging and phasing schedules. However, the impact of inflation also affects the cost of the various alternatives, which in turn affects the monthly sewer rates. Rather than analyzing the impact of inflation on the monthly sewer rates, Metro analyzed the impact of inflation on the present worth of each of the alternatives. Monthly costs for alternatives with increased treatment, and thus higher O&M costs, rise faster over time than monthly costs for tunnel alternatives. The final plan displays in Figure 3-12 (page 83) the impact of inflation on the monthly rates for the recommended program.

It is possible for a low sewer charge alternative to be more expensive in the long run; that is why present worth and inflation analyses were prepared.

Also, see General Responses Numbers 10 and 12, and Response Number 8 to City of Bellevue letter.

7. Spray irrigation is a land application system that utilizes evapotranspiration as the primary means of wastewater disposal. The type of land best suited for spray irrigation is generally flat with soils of slow to moderate permeability. Soils with rapid permeability are not desirable. Soils with extremely slow permeability, soils which are seasonally saturated with groundwater, and soils with groundwater too near the surface are also undesirable for spray irrigation.

Prior to storage in lagoons, wastewater would go through a screening and grit removal process and would then be treated in an aerated lagoon and facultative lagoon. The effluent would then be disinfected with chlorine prior to storage or irrigation.

As to decision-making responsibility, the ultimate decision regarding a land application system will be made by the Metro Council.

8. Satellite pretreatment was considered in Metro's preliminary plan (pages 54-55. It was screened from further consideration because most areas suitable for satellite pretreatment are already connected to the Renton system.

Assuming "in-pipe" treatment refers to aeration of effluent in the interceptors tributary to the RTP, such a system has also been discussed during the course of the study, but was not pursued in greater detail because it would not offer a solution to either the capacity or ammonia concerns at the Renton treatment plant. In-pipe aeration is often used to solve hydrogren sulfide odor and corrosion problems. It does not offer an alternative to either advanced wastewater treatment or diversion to Puget Sound.

9. A sewer moratorium has been considered by Metro as one of more than a dozen interim measures which could be implemented to protect water quality during the interim period while design and construction of the Renton treatment plant expansion is underway. It should be noted that a sewer moratorium does not represent an alternative to expansion of the treatment plant and diversion to Puget Sound.

Metro could, if necessary, temporarily refuse to construct any Metro facilities to serve new areas. However, Metro does not have the authority to prohibit the issuance of building permits or sewer hookups. Action by the Department of Ecology, EPA, and/or local governments would be necessary to impose a moratorium on local sewer hookups. Even if enacted, experience in areas which have imposed moratoriums indicates that such actions may not be effective in slowing increased flows.

In any case, Metro is confident that a moratorium need not be considered. There are other, more effective measures which will be implemented to protect water quality during the interim period.

As to initiation of the planning process, it was not until 1979 that Metro received a grant through the 201 Construction Grants program to prepare a facilities plan. Although Metro had requested funding earlier, there was not enough money to meet all the planning needs in the state. Although flows to the RTP do exceed design capacity, Metro has initiated interim measures which are designed to protect water quality while design and construction take place (see Final Plan, pages 84-90).

As to fines for violation of NPDES permits, the Washington DOE staff have indicated that a maximum of $5,000/day may be imposed.

10. Although shellfish contamination from a Renton outfall to Puget Sound is not expected, shellfish are still impacted by other sources including urban runoff. Compatibility with previous Puget Sound planning was considered in terms of cost-sharing with the proposed Duwamish plant and with CSOs.

As to weighting factors for the evaluation criteria, the criteria in Table 3-5 are not weighted. The purpose of the table was to help identify possibly overriding considerations compared to the least-cost alternative, A-1, which was then discussed in the text. The table was not intended to statistically rate the alternatives against the criteria nor to numerically rank the alternatives.

11. Construction of solids processing on-site at Renton will mean discontinuance of transfer to the West Point plant. During the first 11 months of 1980, solids discharged from the Renton plant were equivalent to 31 percent (81,000 lb/day) of the influent solids load at the West Point plant. Removing these solids will reduce gas production by an estimated 388,000 cubic feet per day, assuming primary solids capture of 60 percent, volatile content of 74 percent, 60 percent destruction of volatile solids in digestion, and 18 cubic feet of gas production per pound of volatiles destroyed. If Renton solids are captured less efficiently than other raw sewage solids and are more difficult to digest because of the waste activated component, the impact on West Point gas production will be less severe.

Production of gas in Renton solids handling facilities is estimated to increase from 388,000 to 2,250,000 cubic feet per day for the year 1980 and 2000 loads, respectively. This is based on current solids projections, 60 percent capture of primary solids with 76 percent volatile content, 70 percent carryover of BOD to the secondary system, conversion of 0.65 pounds of BOD to pounds of suspended solids, waste-activated sludge volatile content of 78 percent, 60 percent destruction of volatile solids in digestion, and 18 cubic feet of gas produced per pound of volatile solids destroyed. The solids system proposed for the Renton plant would produce more energy than required to sustain the digestion process under normal operating conditions. The excess gas would be used to drive engines for pumps and blowers, or generators for electric production, to reduce the energy demand of the rest of the plant. Energy recovery from solids processing would not produce enough energy to supply all of the plant's demand.

As to cost savings associated with trucking the sludge, it is likely that there will be some cost advantage associated with transporting sludge from the Renton site. Generally, Renton is closer to many potential sludge utilization/disposal sites. Of course, the amount of the savings will depend on the ultimate site(s) selected. Decisions about ultimate disposal sites will be made as part of Metro's long-range sludge management study currently in progress.

12. See Response Number 7 to Citizens Committee for Clean Water letter of January 21, 1981.

13. From 1972 through mid-1981, Metro spent approximately $3,440,000 on facility planning for the Puget Sound treatment plants (West Point, Alki Point, Carkeek Park, and Richmond

Beach) and the Renton treatment plant. An additional $1,100,000 was spent on the Puget Sound interim studies and $1,816,000 was spent doing pilot plant work. While the interim studies and pilot plant work may not be considered facility planning per se, they were directly related to the facility planning and are included above for that reason. It should be noted that the total costs identified above include local costs as well as costs reimbursed by state and federal grants.

14. Based on preliminary conclusions reached in Metro's sludge management study, silviculture, soil improvement, and composting have been identified as the most promising utilization/disposal alternatives. These alternatives are currently being analyzed in greater detail. Composting offers the potential for marketing Metro sludge on a limited basis for restricted use (according to EPA's proposed draft of regulations pertaining to the marketing and distribution of sludge products). Metro sludge has also been used by Groco, Inc., to prepare a compost material which has enjoyed a modest marketing success. Metro's long-range sludge management plan will address the role that composting will play in Metro's sludge program.

Magnolia
Community
Club

P.O. BOX 99164 • SEATTLE, WASHINGTON 98199

February 9, 1981

Roger K. Mochnick   M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

The Magnolia Community Club has examined the Wastewater Management Plan for the Lake Washington/Green River Basins draft EIS. The Club has commented on previous documents and has long supported efforts to improve water quality. These efforts have included adoption of criteria to be considered for site selection and construction of treatment plants.

On Feburary 5, 1981, the Club's Board of Trustees voted to request that Metro investigate equality of the existing sewer charge and alternatives thereto. In view of proposed and prospective Renton treatment plant expansion, it appears the existing sewer charge places an unfair burden on Seattle residents and does not place enough responsibility for growth management on the governmental agencies in the Renton service area. It also appears that 65,000 septic tank households are enjoying the benefits of Metro improved water quality, but are not sharing in the cost of these improvements. ①

The Magnolia Community Club recommends that this subject be discussed in the Final EIS.

Sincerely yours,

Janet Anderson

Janet Anderson
President

RECEIVED
FEB 11 1981
ENVIRONMENTAL EVALUATION
BRANCH

Response to Magnolia Community Club Letter of February 9, 1981

1. See General Response Number 12. As to costs borne by on-site system users, see Response Number 6 to Citizens Committee for Clean Water letter of January 21, 1981.

MUCKLESHOOT INDIAN TRIBE
FISHERIES DEPARTMENT
39015 172ND AVENUE S.E. - AUBURN, WASHINGTON 98002 - (206) 939-3311

February 10, 1981

RECEIVED
FEB 13 1981
ENVIRONMENTAL EVALUATION BRANCH

Mr. Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Wa 98101

Dear Mr. Mochnick,

In reviewing the draft Plan summary and E.P.A.'s Draft Environmental Impact Statement on Metro's Wastewater Management Plan for Lake Washington/Green River Basins, we would like to submit the following comments:

The Muckleshoot Indian Tribe, Metro and various sports and recreational organizations, have a vested interest in the water quality of the Green Duwamish River. Water quality has dwindled to dangerously low levels in the river during the summer low flows whereas the effluent from the Renton treatment plant has comprised as much as 25% of the total river flow.

The 4 alternatives described in the E.I.S., A-1, A-3, A-5 and B-1, only two of the alternatives could fully eliminate water quality concerns in the Green/Duwamish River. Alternatives A-1 and B-1 would provide some admonishment to the water quality problems, but they do not solve the temperature problem. Diversion of the effluent from the river to Puget Sound via pipeline to Alki Point or Point Pully seems to be the only practical alternatives, for protection of the aquatic resources provided in the Duwamish/Green River, the salmon and steelhead resources being among the largest in the Puget Sound region. ① *Also a concern which must be addressed is a centralized treatment scheme can precipitate an adverse impact upon the Duwamish River, should the plant have a major failure. Precautionary measures must be implemented to insure minimal impact upon the resources,* ② *thank you for the opportunity to comment.*

Sincerely,

Moore for:

Walter Pacheco, Asst. Biologist

Response to Muckleshoot Indian Tribe Letter of February 10, 1981

1. EPA agrees with this observation. The final plan recommended program calls for diversion of Renton effluent to Puget Sound to protect the Green/Duwamish River fishery.

2. Once the outfall to Puget Sound is built, it would not be possible for a plant failure to adversely affect the Green/Duwamish River.

West Seattle
CHAMBER OF COMMERCE

4210 S.W. Oregon • Seattle, Washington 98116
937-5550

NORMAN A. BEERS
Executive Secretary
Home Phone: 932-5409

February 13, 1981

Environmental Protection Agency
Region X
1200 - 6th Avenue
Seattle, WA 98101

Attention: Mr. Craig Partridge

Gentlemen:

West Seattle Chamber of Commerce is most interested in Metro's Wastewater Management Study. A special committee of the West Seattle Chamber of Commerce recently participated in the Metro Hearing, January 6, at Alki Community Church, under the chairmanship of R.R. Greive. The four Renton 201 Alternatives were presented and discussed. The West Seattle Committee report was made by Ralph Lyall to the West Seattle Chamber of Commerce meeting Monday, January 11th followed by discussion comprising of the Board of Directors and participating members.

From the evaluation of these alternatives, the West Seattle Chamber favors the Point Pulley concept for the following reasons:

1. Cost - Economics, at least $78 Million
2. Shortest distance from Renton is direct line to Point Pulley
3. Least impairment to properties through construction - Community destruction and traffic problems would be greatly accelerated in the Alki Community and along the entire Duwamish from the Renton plant.
4. Puget Sound Water quality of Point Pulley and Alki comparable with minimal effect.
5. Of significant importance: Alki Community is a highly developed residential area. It's quality of life would be impaired through disruption of streets and hazardous traffic problems during the construction process.

①

Therefore, because of the reasons listed above, very careful consideration would be given to the alternate siting of the tunnel rather than at Alki Point or to Alternates A-1 or B-1. Both of these alternates would mitigate the impact to any given community.

Respectfully submitted,

Norman A. Beers
Executive Secretary

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FEB 17 1981
[illegible]

Response to West Seattle Chamber of Commerce Letter of February 13, 1981

1. The trade-offs between Alki Point and Three Tree Point as discharge locations, such as those indicated by this letter, were evaluated in both the Final Wastewater Management Plan and Final EIS.

February 14, 1981
3773 S.W. 171st
Seattle, Wa. 98166

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Wa. 98101
Attn: Mr. Roger K. Mochnick M/S 433

Re: Response to Environmental Impact Statement, Lake Washington/
Green River Basins.

Dear Mr. Mochnick:

We are a committee of interested citizens, mainly property owners in the Seahurst / Three tree Point area which lies within a planning area (see Figure 1) which we will call the Puget Sound East Passage or East Passage for the sake of clarity and convenience of reference in this letter. We are concerned over the impact of Metro's proposal to divert Renton Treatment Plant effluent through a tunnel outfall to an area outside the Metro service area. This area is defined in the Metro 201 plan as alternative A-3-Point Pulley. We recognize that this 201 plan is part of Metro's long range planning process and that the presentation of the various alternatives is consistent with their authority and responsibility as a geographically oriented planner and manager of water quality.

The purpose of this letter is to respond to the draft EIS, 201 plan and to point out to EPA deficiencies in the basic assumptions, the environmental impact statement, the cost-effectiveness considerations, and administrative procedures being followed in their review. We will also propose some alternatives to the proposal.

I Procedure Concerns

Our concerns over the procedures being followed fall into the three categories of Federal, State, and Local governmental actions that must preceed any major development.

Questions on Federal Procedures:

A copy of the Environmental Checklist for the East Passage has not been provided. Has it been completed? If so, when can we review the data? ① What will be the impact on the 201 plan or any alternate plan selected by the Metro Council if you conclude a negative environmental impact would occur as a result of the proposed development? ②

There is no indication a request for an NPDES permit for a "New Source" has been prepared as required by 40 CFR part 124.9 regulations. In addition, part 122.3 indicates a need to determine continuous discharges for all dischargers and set average weekly and monthly discharge limitations for Publically Owned Treatment Works. When do you expect completion of this requirement? ③

The requirement for a Public Hearing (part 124.12) when there is a significant degree of public interest has not been met. Please note that the published versions of the Plan and EIS summaries did not even include Public Workshops in the area affected by the plan alternatives. The Burien workshops were eventually held only after specific requests were made by the community. ④

Is there a draft general permit to Metro for point sources other than storm sewers as required by part 124.58? ⑤

What effect does EPA assumption of lead agency status for the 201 Draft Plan and Environmental Impact Statement have on its ability to consider objectively all the issues raised before it in the review processes? ⑥

Questions on State Procedures

The EPA/State Agreement on Water Quality Management for FY1980, page 79, calls for field samplings of the Duwamish River. John Lampe's Letter * to DOE calls for the State and Metro to "coordinate their methodologies in order to correlate the results of the field sample project". What checks and balances exist to protect the interests and needs of those not included in Metro's planning sphere, in view of Mr. Lampe's other requests and recommendations in the same letter for an increased priority for Metro's geographical planning process and request for area-wide planning powers? ⑦

It is unclear to us just what the impact of the joint hearings on the Draft 201 plan and Draft EIS will be.

More specifically, who is responsible for the review and approval of the 201 plan, and specifically what criteria, questions and checklist is used for the acceptance? Similarily who is responsible for the EIS approval? Is it the same Agency and Department of that Agency? If either the EIS or the 201 plan is rejected, what is the impact on Metro's total program as proposed? ⑧

Questions on Local Government Procedures

When do you contemplate King County doing a 201 Plan for the East Passage area? We understand that several members of the Metro Water Quality Committee did not realize that the East Passage was not part of Metro's service area, was not within its planning scope, and that substantial outfall from Sewer Districts serving this area already exist. ⑨

What are the implications of King County's General Sewerage plan on the alternative selection process? Even though King County has delegated to the Metro Council (Section 2.5 ⑩

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*"Draft FY 1981 State/EPA Agreement" Letter John Lampe to John Spencer, Department of Ecology dated 8/8/80

of the plan) the authority to select its own receiving waters, doesn't the fact that the preferred alternative is located outside of Metro's planning area require the County to amend it's Sewerage Plan in accordance with the procedures outlined therein before the Metro decision becomes effective? This plan is used by all planning agencies and Review Boards in making decisions on service areas and capacity of special districts to provide service and the cost of service.

What are the implications to the citizens of the East Passage with respect to due process and equal treatment under EPA and SEPA Guidelines and WAC regulations? Neither the title nor the Metro process in conducting the 201 study ever related to this area. While we understand the need to find solutions to the pollution discharge problems confronting Metro, we find no factor built into the "Trigger Mechanism" outlined in the Draft Plan that recognizes the planning requirements of the East Passage area and the need to bring King County into the planning process to determine the effects of Metro policy decisions on an area outside the Metro planning area--East Passage. ⑪

The East Passage area is approximately the area of the City of Seattle and has a population of about 200,000 people. According to the General Development Guide of King County, it can be expected to attain a total population near that of Seattle by the year 1990. It has been designated as an infill area in the King County General Comprehensive Plan. It contains two small cities, Normandy Park and Des Moines and two very large unincorporated areas, Burien and Federal Way. We believe the Draft 201 plan and EIS do not adequately address the long-range planning requirements of this area. ⑫

II Environmental Concerns

Impact of Redmond Connection

We do not believe it is logical and in compliance with the intent of the Clean Water Act to divert a large quantity of polluting effluents from the far north drainage area of King County way south to the East Passage area in order to introduce it into a much more ecologically fragile portion of Puget Sound. ⑬

Impact of Reduced Flow in the Duwamish River

The removal of the Renton Treatment Plant effluent from the Duwamish will significantly reduce the flow in the river as stated in the Draft plan. ⑭

The City of Tacoma is reported to have plans for

intercepting still more water from the Green/Duwamish system (up-river from the Renton Treatment plant) that will further reduce the flow. The EIS should be expanded to evaluate this impact. As the flow of the Duwamish is reduced, the agricultural runoff from lands abutting the river will become an increasingly large pollution factor. Similarly, contaminations from surface runoff from all other sources will be less dilluted as the river flow is reduced. These problems are not adequately covered in the EIS.

We understand that the lower Duwamish is to be dredged and extensively developed. We see no mention of this in the draft EIS or plan. Have you considered the impact of this development when coupled with the reduced flows cited above? For example, dredging and widening the river will result in a greater cross-section which will lower flow rates and reduce flushing still further. The EIS should also address the impact of increased salt water incursion as it affects the existing ecosystem should the development occur.

There is a question regarding the water temperature standards during summer low-flow months. This is cited as a problem area in the Summary EIS, however, the draft plan specifies "--this single factor is not considered of such magnitude as to exclude discharge to the Green/Duwamish River".

We suggest that a reduction of flows is not desired. In fact we understand that consideration is being given to controlling the depth of the river by the Corp of Engineers programmed release of waters from Howard Hanson Dam to ensure adequate depth for shipping. Removal of the Renton plant output would require additional drawdown of that dam.

We suggest that the management of the waters of the Green/Duwamish River to maintain a viable fishery is much more complicated that stated and that strong factors, greater than the Renton Treatment Plant impact are involved. We seriously question whether spending $300 to $400 million dollars to divert Renton Plant waters is economically practical to save a $5 million fishery and that that expenditure really guarantees a fishery solution in the light of other factors. ⑮

Impact of East Passage

Both the Draft Plan and the Draft EIS have treated the the impact on East Passage with what seems like casual disregard. Dilution ratio is not the issue, rather it is cumulative concentration of pollutants due to lack of flushing action and recirculation back in East Passage. ⑯

Also the Metro planning seems to ignore the other sewer district outfalls discharging into East Passage, both present and future quantities. There are seven of these currently, not including Tacoma/Commencement Bay.

East Passage must be examined as a system and data developed to show whether the admitted buildup will be significant or not in terms of pollutant concentrations over a period of time. We can find no evidence of any material balance calculations in the Plan or the EIS.

The importance of a northerly current pattern at the outfall is emphasized on pages 44 and 48 of the Draft Plan where it indicates the Alki site is a preferred location over Point Pulley. Page 123 of the Draft EIS points out that Alki is near the zone where northerly and southerly net flows deverge and hence an outflow north of Alki is required to ensure the effluent enters in a net north flow.

Based upon the data provided in the Draft EIS, we se no basis for the statements that Point Pulley will give satisfactory performance. If the performance does not turn out satisfactory, will Metro turn off the pumps, plug up the tunnel, and move the effluent somewhere else? It seems to be a very expensive gamble for a "probably satisfactory" design.

Impact at Point Pulley Outfall

The Draft EIS (page 123) states that additional studies are needed at Point Pulley to "determine local tidal current patterns and risks of shoreward transport of diluted effluent." The Draft plan (page 18) indicates that studies have already shown that an ALki outfall would have "minimal shoreward currents." In the absence of data at Point Pulley, we again feel that any recommendation for an outfall there is premature. ⑰

At the January 13th Burien workshop we were told that a Point Pulley outfall would be 3000 feet long and terminate in 200 feet of water. Will there be a problem in attaining this length if the depths exceed 200 feet? ⑱

It has also come to our attention that chlorination may be required right at the outfall in addition to Renton due to the relatively long residence time in the pipe. What environmental and cost impacts would this have on the project? ⑲

Summary

We believe that the environmental impact of all the proposed alternatives has not be adequately determined and that additional work is required consistent with the Objectives of the Clean Water Act which says performance is the criteria and compliance is required even at a higher cost. ⑳

III - Cost Analysis

When one considers the tolerance on cost estimating proceedures, we believe the data presented does not show enough cost deviation to clearly prove one alternative is better than another. The Draft plan appears to include costs that allow some existing treatment facilities to be shut down or play a reduced part in the total Metro system, while at the same time new collection and transmission facilities are being added. The cost trades include the shut down of Alki and the diversion of sewage from west Lake Sammamish to Renton resulting in a considerable cost increase of the proposed tunnels and greatly impacting the Renton Plant's ability to meet water quality standards for the Green River. For example, if the Alki plant were left in operation (possibly with the outflow extended) the tunnel from Renton to Puget Sound could be made smaller and the total costs would be reduced. ㉑

The Point Pulley alternatives involve 2½ to 3½ times the length of tunnel required for the Alki alternative. Tunnel construction involves unknown costs due to geographical considerations not yet evaluated, hence the geophysical cost estimates for easement acquisition do not look right since it shows a $300,000 for Point Pulley vs $200,000 for Alki whereas the map shows easements of 250% to 1,200% greater lengths for the Point Pulley alternatives. Can you explain this? 22

We have recalculated the differential capital cost between alternatives A-3 and A-5 based upon not closing Alki and correcting for pipe size requirements and a reasonable correction for easement costs and find the $78 million difference is reduced by about $42 million for a difference of only $36 million. 23

Should the proposed development be continued and effluent added to the East Passage area, there is no indication of the impact on the local sewer districts. If Metro is controlling the water quality assessment parameters and recommending caps on State water quality objectives in order to justify their own planning and cost objectives, how do we determine the basis for these extra costs? For example if the 144 mgd added effluent forces the conversion of 24 local sewer plants to secondary treatment, all the extra costs must be handled by the local patrons. It is unfair for Metro to both take most of the grant funds and cause expenses outside their area by this 201 plan. Funds are going to be scarce. The 1981 FY State/EPA Agreement states in part--Executive Summary, Page 5 items 3 & 4 under Municipal Waste Water 3." Erratic Federal Funding. Washington's allotment of Federal funds has been irregular and steadily decreasing since 1976. ",and 4." The original allocation of Washington State Referendum 26 funds available for waste water projects will be obligated to state construction projects within the next two years." Where will the funds come from to cover conversion to higher treatment classifications in the existing outfalls?

IV - Summary

It appears that Metro is trying to solve a 20-year
problem with a single macro solution. We believe that the
current approach based upon the Lake Washington Basin Federated
Plan of 1958 does not take into account the changes since that
date. A Three Tree Point-Point Pulley outfall solution pro- ㉕
posed in 1958 prior to the creation of Metro does not rec-
ognize the development in the East Passage area since that date
and the changes in State Law that required the development of
a King County General Sewerage Plan. It is obvious that Metro
only has a geographically oriented planning power within its
natural drainage basins. Other drainage basins outside of Metro's
purview are served by Sewer Districts specifically set up to
provide service to that area. We feel that Metro's shifting
of sewer and surface water pollutants to our drainage and service
area without any of the required impact considerations (see SAVE ㉖
vs City of Bothell*) or the planning procedures required (see
Barrie vs Kitsap County) constitutes a violation of our property
rights. We feel that the Metro Council should be advised that
transferring pollutants to another drainage basin without adequate
planning and impact assessment is inconsistent with existing law.
We believe that any decision with respect to use of the East Pas-
sage area must at least be delayed until the final NOAA report ㉗
on the Puget Sound Basin and its drainage characteristics is
complete.

Recommendation

It is not logical to allow the construction of the ㉘
Redmond Connection which will divert at least 75 mgd to the

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*89 Wn.2d 862

Renton Treatment Plant. This would require the doubling of the Renton facility while precluding further development in South King County in the Green/Duwamish Valley. By proper planning and location of a new plant in the North County, Metro should also be able to prevent the failure mode that results in dumping raw sewage into the Sammamish River. We strongly recommend that EPA/DOE disapprove the planned Redmond Connection or any other connection that will bring sewerage from north of the existing lines in Bellvue to the Renton Treatment Plant.

We request that EPA ask that the Metro Lake Washington
/Green River 201 plan be split into: "South Lake Washington/ ㉙
Green River 201 Plan" and "North Lake Washington/Lake Sammamish
201 Plan" and that a better plan be developed to meet the needs
of the North King County area.

We recommend that the Phase I development of the Renton
Treatment Facility be a capacity growth to the maximum carrying
capacity of the Green/Duwamish River as a determined by the
Corp of Engineers flow rate controls. We assume that any devel-
opment in the lower Duwamish will be done with Corp of Engineers
approval. In addition, the equivalent solid waste processing ㉚
capability should be added to help off-load West Point. As
we see it, West Point is not operating as a normal primary
treatment facility when its process waste is concentrated by the
sludge from the Renton Plant. There is continuing need in the
Kent Valley for land fill so that there should be plenty of appli-
cation for the residual solids.

Further action on the 201 Plan should be delayed until
completion of the Final-Enviromental Impact Statement. Per WAC
197-10-055, the purpose of the EIS process is to provide env -
ironmental information to Governmental Decision Makers to be
considered prior to making their decision. The process should ㉛
thus be completed before the 201 plan is completed and prepared
submittal to the Metro Council. At a minimum, a threshold deter-
mination and required EIS shall be completed prior to an agency
committing itself to any proposed major action.

Should Metro desire to continue with their proposed
plan to route effluent to either Point Pulley and East Pas-
sage or to expand the output at Alki, a 201 study of the East
Passage area must be first completed by King County. We request ㉜
that EPA/DOE consider granting King County the fundsnecessary
to cover the costs of preparation of an East Passage 201 study

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*93 Wn.2d 843

and also provide appropriate support for contiguous areas in Pierce and Snohomish Counties. If Puget Sound is to become the primary receiving waters for effluents we feel that extensive, well planned and executed planning and monitoring systems should be in place as soon as possible.

We would appreciate your attention to our concerns. We hope that you realize that we were only advised of the hearing and response period three weeks ago. We wish to iterate again our great concern and disagreement with this planning and public review procedure where we, as primary impacted parties, were completely left out of the process. ㉝

Very truly yours,

Puget Sound Water Quality Committee
K.W. Smith III Pres.

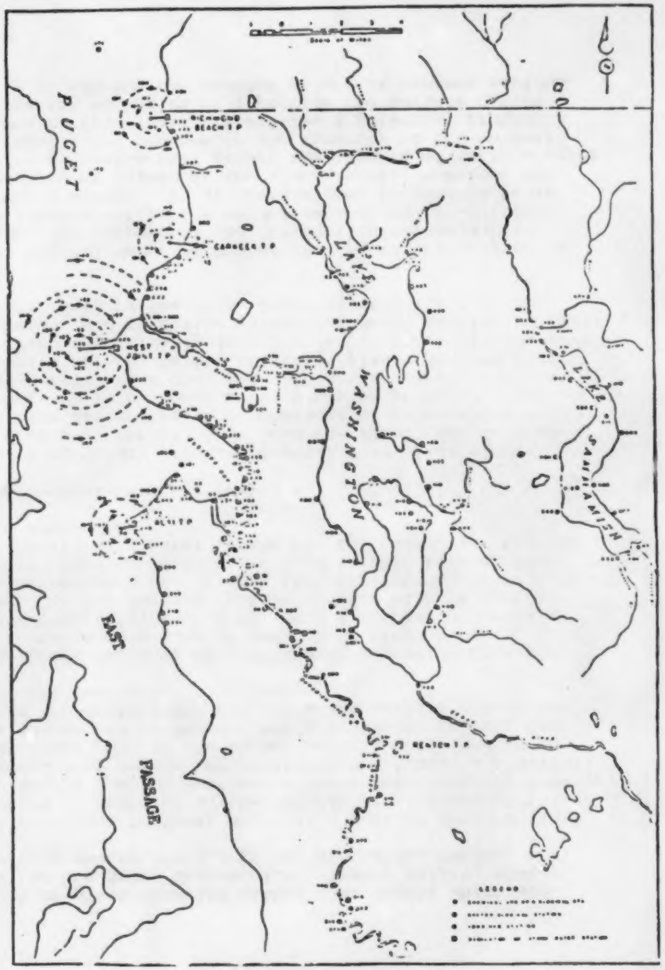

Figure 1
Metro Water Quality Monitoring Stations

Response to Puget Sound Water Quality Committee Letter of February 14, 1981

1. An "Environmental Checklist" is a requirement of the State Environmental Policy Act. The federal EIS prepared by EPA will serve to satisfy both the National and State Environmental Policy Acts. Rather than preparing a separate environmental checklist, Metro will formally adopt this EIS as compliance with SEPA.

2. Under the National Environmental Policy Act, EISs must fully disclose all potential adverse impacts of a project and describe mitigation measures to avoid or reduce such impacts. There is no requirement, however, that a project be disapproved merely because it has unavoidable adverse impacts. If unavoidable adverse impacts remain, the responsible official determines, in consultation with other agencies and the public, whether project benefits outweigh these adverse impacts. In this case, EPA will work with Metro to ensure that an environmentally acceptable alternative is selected and needed mitigation measures are implemented.

3. DOE anticipates providing a draft NPDES permit for the Renton discharge to Puget Sound by December 1981. There would then be a review period of 30 days or longer before this permit is finalized. The effluent limits would be standard secondary. These require 85 percent removal of biological oxygen demand and suspended solids, and no more than 30 mg/l of these constituents.

4. See General Response Number 14. A public meeting was held in Brien specifically to obtain input from Three Tree Point area residents on the draft plan and EIS. The residents were also notified at that meeting, and in the draft plan and EIS, of the opportunity to formally comment on the draft plan and EIS at the public hearings in late January 1981.

5. 40 CFR 124.58 refers to special requirements for general NPDES permits issued by EPA. Since Washington State administers its own NPDES permit program and since, in the case of the proposed Renton outfall, a specific rather than general permit would be issued, this section is not applicable.

6. See General Response Number 13.

7. While Metro's jurisdiction includes all of King County, Metro's enabling legislation allows Metro to provide service outside King County by contract with local agencies. There are local sewerage agencies within King County which are not part of the Metro system, i.e., Vashon Island, southwestern King County, cities in the Snoqualmie Valley, etc.

If diversion to Puget Sound is a part of Metro's final plan, which is approved by the federal Environmental Protection Agency and the Washington State Department of Ecology, Metro could then design and construct the tunnel and outfall to Puget Sound even if the tunnel/outfall were located in an area not served by Metro. Metro would, of course, have to secure the appropriate easements and permits regardless of the route selected.

8. The joint hearings were intended to provide citizens with a formal opportunity to make their views known to both Metro and EPA officials. Public views are to be carefully considered in the decision-making process of both agencies. Joint hearings were held rather than separate hearings because it was felt this would make the relationship between Metro and EPA decisions clearer to the public. Also, see General Response Number 13.

9. See General Response Number 4.

10. The King County Sewerage General Plan is an element of the County's Comprehensive Land Use Plan. The Sewerage General Plan designates those portions of unincorporated King County to which sewer service may be provided. The Sewerage General Plan does not affect the selection of an outfall site for the Renton treatment plan. The Sewerage General Plan specifically states that "...the location, level of treatment, and receiving waters for Metro facilities shall be as determined by the Metro Council" (Section 2.5, A, page 12).

11. See General Response Number 14. As to the triggering mechanism, the purpose of the "triggering mechanism" is to provide advance notice for needed expansions or additions to the Metro system. It is not designed to resolve wastewater management issues at the local level. However, the triggering mechanism will report the results of Metro's water quality monitoring program in the vicinity of the outfall. If the monitoring program identifies a potential problem the triggering mechanism will provide the advance notice necessary to address the problem before it becomes serious.

12. There is no obvious relationship between selection of a wastewater management plan for the Renton study area and meeting the long-term sewerage needs of the East Passage area. If the question assumes that Puget Sound has a highly limited assimilative capacity for wastewater that future discharges from East Passage communities would completely utilize, there is no evidence to support this idea.

13. Under its recommended program, Metro has deferred the decision on whether to divert wastewater from the north part of the study area to the Renton plan. Also, there are no data in the Final EIS to indicate that the East Passage is more ecologically fragile than Puget Sound waters farther to the north, although circulation differences do exist.

14. See General Response Number 3.

15. The Department of Fisheries estimates the total annual value of the salmon runs in the Green/Duwamish River to be $4 million, rather than $2.6 million as originally estimated in the Draft EIS. The Northwest Steelhead and Salmon Council has indicated that the annual value of sport-caught steelhead has almost tripled since 1976. The Council estimates that the total value of the steelhead runs in the Green/Duwamish River is about $7.5 million, rather than the $2-3 million estimated in the EIS. Thus, the total annual value of the Green/Duwamish River fishery, in current dollars, is probably over $10 million, rather than the $5 million estimated in the Draft EIS.

If the Renton treatment plant is expanded without diverting flows to Puget Sound or alternatively providing an advanced level of treatment, a portion of the capital cost of proposed alternatives would be saved, but the very existence of the salmon and steelhead fisheries would be jeopardized. As flows to the treatment plant increase in the future, the entire $10 million annual value would be at risk and could be permanently lost.

Alternatives calling for diversion to Puget Sound also can be compared to Alternative A-1, which recommends expansion of the Renton plan, an increase in the treatment level to nitrification and continued discharge into the Green/Duwamish River. The savings between Alternative A-1 and the least expensive diversion alternative is $12 million (present value). In this case, the immediate threats to the fishery -- ammonia and oxygen-demanding wastes -- would be reduced, but fish migration could still be adversely affected by temperature increases and treatment process upset, though probably not to the point of threatening the entire value of the fishery. At a discount rate of 7 1/8, it would taken an average annual loss of about $1.5 million to the salmon and steelhead fisheries, for 20 years, to just exceed a present value loss of $12 million, thereby more than eliminating the cost savings of avoiding diversion to Puget Sound.

The State Department of Fisheries estimates that, as a practical matter, the Green/Duwamish salmon and steelhead fisheries could not be replaced if lost. Therefore the cost savings associated with less protection of the fisheries could not be used to replace resulting fishery losses.

Although the discussion at public meetings and in the Draft EIS has concentrated on the economic value of the salmon and steelhead fisheries, other costs of water quality deterioration should be considered. These include the economic losses to bottom fish in the Duwamish River and estuary downstream from the treatment plant, loss of investment in state fish hatcheries upstream (estimated at about $4 million), and the nonmonetary, aesthetic costs associated with losses to the salmon and steelhead runs.

16. See General Responses Numbers 1 and 2. Pollutants would not build up indefinitely in Puget Sound because a net exchange of Puget Sound water with the open ocean exists due to estuarine circulation patterns. An analysis of the cumulative pollutant loadings to the southern sound (south of Alki Point) is presented in Chapter 6 of the Final EIS.

Although the EIS predicts no major water quality impacts with a Seahurst Park discharge, if ongoing monitoring were to indicate the potential for water quality problems, appropriate action can be taken before the problem becomes serious. Several options are available for the Renton outfall, such as: extending/redesigning the outfall; increasing the level of treatment; requiring stricter source controls/pretreatment; and setting an upper limit of less than 144 MGD to the Renton discharge. DOE also plays a role through the issuance of NPDES permits to all municipal and industrial dischargers. If monitoring indicates that problems are developing, DOE can require that dischargers take appropriate remedial action through the NPDES process.

17. See General Response Number 1.

18. The statement that the outfall should be 3,000 feet offshore in 200 feet of water is an initial estimate of the distance and depth necessary to avoid the influence of eddies in the vicinity of Three Tree Point. Detailed oceanographic studies will be used to develop the design criteria for the specific depth and distance of the outfall. The intent is to design the outfall in such a way that good mixing and dilution will be achieved.

19. The residual chlorine level will be less than 0.01 mg/liter. The effluent limit for chlorine in the existing discharge permit for the Renton discharge to the Duwamish River is 0.5 mg/liter. EPA's ambient water quality criterion for chlorine is .002 mg/liter. The Renton effluent of 0.01 mg/liter would meet this after 100:1 dilution. Although adverse impacts from chlorine residuals are not expected, monitoring will be done for chlorine compounds.

20. Additional water quality investigations have been performed for the Final EIS. These studies verify the Draft EIS conclusion that no major water quality impacts are expected with a Seahurst Park discharge. Also, see General Response Number 15.

21. Even if the suggested service area changes were made, the sizing of either the Alki or Seahurst tunnels would be the same to provide for long-term growth. If it is assumed the Alki plant would continue in operation, the costs of the Alki tunnel would be reduced $15.4 million in capital costs, equivalent to $12 million present worth.

22. Both the draft plan (Figures 2-12, 2-14, and 2-29) and the final plan (Figure 2-16, page 46) show easement costs for Seahurst Park at $200,000 and Alki at $300,000. (It appears the commentor may have transposed the cost figures.) These figures are considered accurate by Metro's engineering consultant after a review of their analysis. The map is not intended to be used to calculate relative easement costs.

23. See responses to comments 21 and 22 above.

24. Based on existing information, it is not anticipated that discharge of secondary treated effluent from the Renton treatment plant will lead to increased costs for treatment at other local Puget Sound dischargers. Adverse cumulative impacts to the East Passage area are not predicted. Washington DOE, which has responsibility for coordinating the requirements of various discharge permits in Puget Sound, has expressed support for a Puget Sound discharge from the Renton plant. Of Southwest Suburban Sewer District's two treatment plants, one is already at secondary treatment. The NPDES permit for the other plant already requires upgrading to secondary in the future and Southwest Suburban has begun facilities planning to accomplish that. However, DOE states that that plant is low on DOE's priority list for upgrading, due to its discharge to unconfined marine waters, and DOE has recommended that facilities planning be discontinued until a future time.

25. There is no evidence that development in the East Passage area, and resulting wastewater discharges to Puget Sound, have used up the sound's assimilative capacity for wastewater discharges. The King County Sewerage General Plan leaves to Metro the primary decision-making role regarding waste discharge location, and the Metro plan is consistent with the service areas shown in the Sewerage General Plan.

26. See Response Number 7 above.

27. The results of the NOAA investigations, which are basic research studies rather than impact assessments, are highly unlikely to change the decision regarding the discharge location for Renton effluent. It should also be recognized that delay is not cost-free, in that degradation of the Green/Duwamish River would continue to worsen while awaiting results of future studies.

28. The final plan recommended program follows this recommendation by deferring to a later time decisions about where to treat and discharge flows from the north part of the study area. Also, the probability of an emergency bypass at the York pump station, in the event the Redmond connection were built, would be very small because emergency power generation equipment would be provided.

29. The final plan follows this recommendation, in that it represents decisions only for the Renton treatment plant service area. Final decisions on wastewater management for the north part of the study area will be made as the previous EIS for Metro's Puget Sound plant configuration is supplemented and finalized.

30. See General Response Number 3.

31. EPA is following its standard procedures regarding a final decision on the plan. The EPA decision will not be made until the Final EIS is released for public review and comment. Following review of public comments, EPA will issue its formal Record of Decision.

32. See General Response Number 4.

33. See General Response Number 14.

RESOLUTION OPPOSING METRO WASTEWATER DISCHARGE INTO LOWER PUGET SOUND

WHEREAS, Metro proposes to dump 144 million gallons a day of effluent into Puget Sound North of Three Tree Point, and

WHEREAS, the area South of Alki Point has little water movement, studies indicate that up to 25 percent of the water doesn't leave the area, tidal flow is to the South (there is some flood but little ebb) and water doesn't flow North until it reaches the west side of Vashon Island, and

WHEREAS, this area by Metro's own description is materially different from West Point and other areas being used for comparison, and ①

WHEREAS, already the negative impact of the Des Moines Sewer District and the Southwest Suburban Sewer District on the Sound with an increase in water temperature, rise of the effluent water and solid materials to the surface floating on the salt water and congregation of birds, and ②

WHEREAS, three of the proposed sites are onto and into a unique area with a beach front and area catering to quiet family usuage both beach and water, and an area of unique fish and fowl, and

WHEREAS, the fourth location - Alki - is already impacted and dumping the effluent there is in an area already effected by urbanization, and ③

WHEREAS, the EPA's study indicates there will be localized increases in turbidity, ammonia and heavy metals -- many that are dangerous to life, and ④

WHEREAS, the Alki area has much more rapid water movement, this movement is to the North and will carry the effluent much more rapidly to the Ocean according to the EPA study and personnel at the University of Washington, and

WHEREAS, the Alki site could cost up to 20 to 25 percent more it still does not carry the gamble to human life and the enviroment, and ⑤

WHEREAS, this proposed project could materially and negatively effect the long term development of South King County, and ⑥

WHEREAS, there are indications that the widening of the Duwamish River channel to 250 feet could have increased silting and problems if the effluent water was removed. ⑦

NOW THEREFORE BE IT RESOLVED, that we oppose the location of this effluent outfall at other than the Alki location or the present River, urge our legislators and congress members to oppose funding grants to other than the Alki or Duwamish River location and call on the EPA to support other alternatives unless they are North of Alki Point.

Adopted at a regular meeting of the 33rd District Democratic Organization February 10, 1981.

Signed
Carol S. Rose
Carol S. Rose, Enviroment Chairman
229 S.W. 183rd
Seattle, Washington 98166

RECEIVED
FEB 27 1981
ENVIRONMENTAL EVALUATION
BRANCH

Response to 33rd District Democratic Organization Letter of February 10, 1981

1. See General Response Number 1. Even though 25 percent of the water may recirculate around Vashon Island, all water eventually does leave the south sound. The equilibrium concentration of effluent, with new effluent entering the sound and old effluent leaving, would be about 0.067 percent, assuming 1,500:1 final dilution.

2. Impacts of the present outfalls may be attributable to less efficient treatment and disposal facilities. For example, the Des Moines Sewer District and the Redondo sewage treatment plant outfalls discharge only primary treated effluent. The Renton effluent will be secondary treated. Solids and floating material will be removed in the treatment processes.

3. The beneficial uses of the shoreline near Alki Point and the effects of the existing discharge at Alki Point have been recognized in Chapter 6 of the Final EIS.

4. Although the EIS predicts localized increases of certain pollutants in the immediate outfall vicinity, it predicts that these increases will have no major adverse impacts, other than possible accumulation of heavy metals in shellfish in the immediate outfall vicinity.

5. See General Response Number 1.

6. The means by which long-term development of south King County could be adversely affected by the Wastewater Management Plan are not apparent.

7. See General Response Number 3.

SUBJECT: Waste Water Management Study for Lake Washington/Green River Basins - Renton 201 Study - Public Hearing 21 January 1981.

TO: Metro Council
821 Second Avenue
Seattle, WA 98104

ATTN: Gerry Larrance

REFERENCES:

1) Waste Water Management Study Lake Washington/Green River Basins (Draft Plan) December, 1980
2) Metro Waste Water Management/Draft Environmental Impact Statement

I am Tom Miller, I represent the South King County Chapter of the Northwest Steelhead & Salmon Council. We wish to make our statement both orally here tonite and will submit written copies at this time.

First a basis for our input. We have a vested interest in the Green/Duwamish River. Our Chapter was formed in 1969 and adopted the Green River for project development. In 1971 we developed a rearing facility for Chinook Salmon at Icy Creek in the Green River Gorge. The program was such a success, the State Fisheries Department took this facility over and has expanded it into a fulltime Salmon facility. For our success, the Chapter received Trout Unlimiteds' Golden Trout Award. It is a national award given annually to the organization that does the most for the cold water fishery.

Next, in 1976, we went in cooperation with Washington State Parks Department and the Game Department into Flaming Geyser Park and turned some broken down old Trout ponds back into usable structures. We then began a Steelhead Imprint Program in which we annually introduce 15,000 winter run Steelhead and 10,000 summer run Steelhead into the Green River. We continue this successful program each year.

In 1978 we started a joint program with the Green River Steelhead Club in cooperation with the Game Department, capturing wild and native Steelhead. This was done in the Green River and the eggs used for propagation. By using this method we have cut egg mortality by 80% and started the Green River native stocks back on the increase. Last year we released 150,000 fry from this program and are working for 450,000 this year.

All the man hours, equipment and gasoline are at the individual expense of the members for all these projects. We feel we have earned the right to be concerned about the Green River.

Now to the business at hand. Our objective in respect to the Green/Duwamish River is multi-fold and as follows:

1) Preservation and further enhancement of this valuable fishery
2) Continued development and preservation of this valuable resource for total public recreation
3) To work with local, state and federal agencies to ensure that the foregoing objectives are attained and that the public interests in this resource are protected.

The principle thrust of our objectives of preservation and enhancement of the fishery have been addressed to by Metro in referenced documents. However, to bring more vivid focus and specific emphasis to the public and provide more detailed facts for the public record the following summary and description of this fishery is furnished.

The Green River has become perhaps the most important fishery and recreation

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area (of this type) in the state of Washington. Adjacent to the river is our most populated area. The demands upon this river by the recreation-oriented populous is tremendous and have increased ten-fold in the past 5 years and will continue to increase at this rate for the foreseeable future. Continued rapid population growth, energy costs, loss of other fisheries such as the Toutle River, and the ever increasing public interest are major contributing factors to this intense demand. The Green River provides the principal beauty and character the valley cities possess. Without the river the valley cities skirting its banks would be quite ordinary and perhaps even dull. Too many take it for granted. ①

The Green River is considered a major year-round migratory fishery. It is significant to note that there is migration of summer run Steelhead Trout May-Sept., Winter run Steelhead Trout Nov.-Mar., Native run Steelhead Trout Mar.-May, Fall Chinook (King) Salmon Sept.-Oct. and Coho (Silver) Salmon Oct.-Nov. During the entire year there are literally hundreds of thousands of fingerling fry and smolts of these species present in the river.

Metro's 1976 cost factor of this fishery is less than one half what it is today. Sport caught Steelheads value alone has almost tripled since 1976. To give you insight as to how this is figured and what an impact would affect, I will explain. Take the tackle (all accountable because of special taxes), boats, motors, fuel and camping fees, licenses, add it up divide by the total number of sport caught fish and you have the figure at present. It falls near $350 per Sport caught Steelhead. ②

The Salmon harvest credited to the Green River has also excellerated since your figures were taken. It has doubled since 1976 in dollar value.

To put it bluntly an impact to the Green River will be felt both by the business community and Sportsman alike.

In conformance to the Clean Water Act, regulation established by Department of Ecology, and standards furnished by the Environmental Protection Agency, Metro is required to conform to minimum treatment of wastewater at the Renton Treatment Plant. The current volume treated is approximately 41 MGD. Plant capacity is 36 MGD. Properly equated this means that current treatment does not conform to standards and regulations established. ③

If the standards and regulations are to be meaningful and thus actually the law, it can be assumed they are a basis of authority for Metro. In view of this interpretation, the following recommendations are made:

1) Adopt alternative A-3 or A-5 (in order of preference) wastewater outfall. Extensive studies disclose no impact on marine life, the environment or the aesthetics ④
2) Until (1) above is fully operable impose a "Sewer Hook-up" moritorium on all industry or business which will impose chemical solvent, or otherwise toxic waste and/or effluent to the Renton Treatment Plant Facility. This moritorium should be immediate as the present facility is already overloaded. EPA and DOE standards and regulations should provide ample authority for this action. If they can authorize new construction, they can stop it. ⑤
3) Accelerate current schedules to permit construction completion prior to 1985. ⑥

-3-

It is our determination and intent to maintain, protect and improve this resource by all means available. Hopefully our in-put will be constructive and create a greater awareness, interest and desire by the public, industry and participating Governmental agencies to preserve the Green River.

Respectfully,
Thomas L. Miller
James J Leonard
Tom Miller
James J. Leonard
Board of Directors
N.W. Steelhead & Salmon Council
South King Co. Chapter

cc: Ron Dunlap
King Co. Exec.

cc: Mayor Isobel Hogan
Kent City Council

Muckleshoot Tribe

D.O.E.

E.P.A.

Trout Unlimited

N.W.S.&S.C.

Wash. Environmental Council

Green Peace

Citizens Committee For Clean Water

Response to Northwest Steelhead and Salmon Council Testimony of January 21, 1981

1. The resource values of the Green/Duwamish River have been recognized in the EIS.

2. The Final EIS contains updated cost factors recognizing the increases in the Green/Duwamish River's fishery value since 1976.

3. Although current flows are above the plant's rated capacity, Metro, by stressing the treatment system and employing contingency measures, is able to meet the requirements of its current effluent permit.

4. The final plan recommended program is a variation of Alternative A-3, in which Renton effluent is diverted from the Green/Duwamish River to Puget Sound.

5. See Response Number 9 to Citizens Committee for Clean Water letter of February 16, 1981.

6. The final Metro plan includes the proposed construction schedule in Figure 3-10.

CITIZENS

January 7, 1981

Dear Mr. Partridge,

Don't dump that dirty waste in Puget Sound. I'm willing to pay for higher levels of treatment so the liquid waste can be dumped anywhere safely. I only wish that others could be convinced that in the long run it will be safer and perhaps even cheaper. I don't want our beautiful body of water affected as it most certainly will be.

There are many subtle changes made before fish die and clams are poisoned. Consider the food chain. Who knows which small organism will be killed and thus break the chain? Who knows which organism will develop toxic levels of this or that affecting the chain? Every year levels of substances previously thought to be safe are found to be harmful. How can you presume to take into account all the unknowns? And if you agree there are unknowns, is it worth the risk? I would think we have enough toxins floating around in the air and water to worry even the most unobservant. But this is a biggy and one that could be averted with less trouble than most - a few more dollars a month. I feel it would be very near sighted to dump the waste as planned and that there would be major ramifications in the years to come. ①

Sincerely,
Patricia Norris
5021 Beach Dr SW
Seattle Wa 98136

RECEIVED
JAN 12 RECD
EPA-EIS

Response to Patricia Norris Letter of January 7, 1981

1. See General Response Numbers 1 and 2.

2106 47th Avenue SW
Seattle, WA 98116

January 9, 1981

RECEIVED
JAN 12 RECD
EPA-EIS

ENVIRONMENTAL PROTECTION AGENCY
Region X
1200 Sixth Avenue
Seattle, WA 98101

ATTN: Mr. Craig Partridge
M/S 443

Dear Craig:

The METRO expansion presentation at the Alki community meeting on January 6 was conducted in a professional manner and was, I believe, very effective in determining citizen opinions on the program.

Two comments during the meeting were of particular interest to me. Mr. Bauman of METRO stated that "all five (sic) options presented were acceptable in terms of water quality." Mr. Herson later stated that "circulation differences between the two choices (Point Pulley and Alki) may not be significant." The import of these two statements is that they make the $78 million cost differential favoring the Point Pulley alternative more significant. ①

I believe that the environmental impact process to date has failed to focus on the real quality of life issues associated with the locations selected for the METRO project. As I attempted to point out in the meeting, quality of life is very much a function of the perceptions of the community, and despite any scientific evidence, the quality of life for the residents of Alki will be diminished if METRO were to construct the large scale sewage outfall project in their community.

The environmental impact process should take into consideration the nature and structure of the communities where these projects are envisioned. With a little study, I am sure you will agree that the Alki area has had more than its share of unfavorable circumstances for a residential community including environmental, social, and developmental impacts. From the environmental viewpoint, the community has suffered from odors from the existing treatment plant, shellfish toxicity, "red tide" beach closures, and landslides. ②

There are some serious and continuous social problems resulting from the desirable recreational nature of Alki and the proximity of the beach to residences:

1. Vandalism and burglaries
2. Litter
3. Excessive noise from recreational activities
4. Youth alcohol and drugs
5. Traffic congestion, air pollution, and noise; motor vehicle speeding on residential streets.

Finally, there have been pressures to increase the residential density of the area ranging from condominium developers to proponents of high density-low income housing.

As an admitted layman in this field, it is difficult for me to comprehend how the marginal benefits of water circulation would justify the expenditure of an additional $78 million to construct this project in Alki. I believe that the negative impact on the perceptions of Alki residents and indeed on the thousands of recreational users of Alki is a decisive agrument against the selection of this alternative. ③

Sincerely yours,

Greg Schuler
West Seattle Resident

ss

cc: Hon. R. R. "Bob" Grieve, King County Council
State Senator Phil Talmadge
Mr. Jeff Bauman, METRO
Hon. Jack Richards, Seattle City Council

Response to Greg Schuler Letter of January 9, 1981

1. See General Response Number 1.

2. See General Response Number 8.

3. Metro's Wastewater Management Plan evaluation agrees with this observation, in that overriding benefits of an Alki Point discharge were not found which would justify the increased costs of this alternative.

RECEIVED
JAN 15 1981
ENVIRONMENTAL EVALUATION BRANCH

January 9, 1981

Dear Mr. Partridge,

We attended the Metro meeting held in the Alki Congregational Church Tuesday, January 6th. We are in complete agreement with those speakers in the audience who protested the Metro plan to tunnel through West Seattle and empty effluent into Puget Sound.

We are strongly opposed to effluent being emptied into Puget Sound at any location.

New development in the Greater Seattle area is almost inevitable, with the result that; if the pipeline project is carried out as planned, an ever-increasing volume of effluent will be released into the Sound to the point where marine life is endangered, as it is now endangered in the Duwamish River, and recreational areas become obnoxious; at that time, when there is nowhere else to go, Tertiary Plants will become a vital necessity. ①

We believe that Tertiary Plants are the only feasible and final solution to this problem, so let's start building now before inflation makes it prohibitive. Please stop spending time and money researching plans which may well become obsolete even before they leave the drawing board. ②

Thank you for giving us this opportunity to express our opinions. Believe us, we are sympathetic to your problem because it is also our problem.

Disadvantages of Pipeline project

Irrevocable damage to Puget Sound waters. ③
Possible damage to existing adjacent properties.
Soil conditions in West Seattle (unstable terrain).
Drainage and Flooding caused by disturbance of natural drainage areas.
"Cave-ins" due to heavy rains or snow. ④
Earthquake hazard. West Seattle lies on an earthquake fault.

Disadvantages of Tertiary Plants

Expense which is inevitable anyway in the final analysis!

Sincerely yours,
Residents of 60th Avenue SW

Edward & Natalie Hauptmann 3400 60th SW Seattle 98116
[illegible] 98116
Mrs Virginia E. Pederson. 3260 60th SW 98116
Mike and Sue Galvin 3425 60th SW
[illegible] Marj Mathews 3440 60th Ave SW 98116
[illegible] and Victor H. Reis 3420 60th Ave. SW 98116
[illegible] 3256 60 Ave. SW 98116

Response to Residents of 60th Avenue Southwest Petition of January 9, 1981

1. Damage to marine life is not foreseen under the scope of the project as presently planned.

2. The high cost of tertiary treatment for discharges to Puget Sound is not justified because significant effects on the marine environment have not been found with properly designed secondary (and in some cases primary) treatment systems. Also, even tertiary treatment does not remove all potentially toxic substances.

3. Damage to Puget Sound is not foreseen. See General Response Number 1.

4. See General Response Number 7.

RECEIVED
JAN 15 1981
ENVIRONMENTAL EVALUATION
BRANCH

A. Noel Nelson
3126 S.W. 172nd
Seattle, Wa. 98166

January 14, 1981

Mr. Roger Mochnick M/S 443
EPA, Region X
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Mochnick:

Last night I attended the meeting held by Metro to discuss the proposed plan to divert sewage effluent from the Renton Plant via a tunnel into Puget Sound.

Between four and five hundred people from this area (Burien/Shorewood/Three Tree Point) voiced extreme negative reaction to location of an outfall in our community.

Reflecting on the many concerns expressed at this meeting two, in particular, seem to be of greatest importance to us.

① Environmental impact to the people in the community must be taken into consideration by the E.P.A. We appreciate your concern and protection of water quality, but you need to be concerned also for the protection of occupied private properties at the point of outflow. Regardless of the purity of the effluent, human sewage discharged into the sound at any given point will have an inherent negative effect on the property values in the area. The desirability of residing within even a larger area surrounding the outflow is reduced significantly.

There is a need to locate the outflow in as isolated an area as possible (away from bedroom communities).

Specifically, this speaks to a location in a commercial area such as Elliott Bay.

② The most effective diffusion of the effluent once it is in the sound is a second viable argument against location of the outfall in South Puget Sound. It is obvious that the location of any outflow at a point south of the northern tip of Vashon Island will force diffusion of effluent in a southerly direction. It is equally obvious that any location of an outflow north of the northern tip of Vashon Island is a definite best location for now and for many years in the future.

In conclusion, I respectfully request that the E.P.A. re-evaluate the impact of this proposal on the people environment of the Highline/Burien area.

There is a need to include this evaluation in your document, Metro Wastewater Management - Summary Draft, Environmental Impact Statement, which currently represents an E.P.A. opinion prior to surveying the peoples' concerns. I further encourage your department to support the best location of an outflow into the sound which would most quickly and effectively diffuse effluent and move it out of the sound, a point north of the northern tip of Vashon Island.

Thank you for your support in protecting our environment.

Sincerely,

Response to A. Noel Nelson Letter of January 14, 1981

1. See General Response Number 8.

2. See General Response Number 1.

RECEIVED
JAN 16 1981
ENVIRONMENTAL EVALUATION
BRANCH

Jan. 15, 1981
13356-75 ave S.
Seattle 98168

Mr Roger Mochnick
Mail Stop 443
Environmental Protection agency
1200 - 6 ave. Seattle, Wa. 98104

Subject: E.I.S. For Wastewater management Plan for the Lake Wa./Green River Basin

Dear sir:

We object to this whole project as presented in the E.I.S. because of the following:

① 1) alternates such as piping along or through the Duwamish River to terminate at close proximity to Elliot Bay were not considered in detail. alternate A, B, & C, which are basically the same, were discussed in far greater detail.

② 2) The burden placed on the existing customers of Metro to finance this project is not equitable method of financing. The future connectors should pay for the majority of the Cost through special Connecting charges.

③ 3) This project should not be started unless Federal (75%) and State (15%) funds are granted.

④ 4) Sewage should not be diverted from Woodinville Redmond and so forth to the Renton Plant.

⑤ 5) The West Point treatment Plant should be enlarged to provide secondary treatment.

⑥ 6) Industrial expansion and treatment of toxics and heavy metals have not been adequately discussed.

Sincerely
Mr & Mrs. Henry Wheeler & Jerry.

Response to Henry Wheeler Family Letter of January 15, 1981

1. An Elliott Bay discharge was considered early in the facilities planning process. It has higher costs than a Seahurst Park discharge, and Elliott Bay has poorer dispersion characteristics than the open waters of Puget Sound.

2. See General Response Number 12.

3. Metro has included a discussion of financial planning in Chapter 3 of the Final Facilities Plan.

4. The final plan recommended program defers the decision on where to treat and discharge wastewater flows from the north part of the study area.

5. Alternatives for the West Point treatment plant will be re-evaluated as part of the secondary treatment waiver process and Final EIS for the West Point plant.

6. The Wastewater Management Plan assumes a continued growth in industrial discharges roughly proportionate to population growth. Industrial pretreatment and toxic substances control are being evaluated in Metro's toxicant study which is currently in progress.

Metro has an industrial waste section which administers an EPA approved pretreatment program and issues discharge permits for all industrial dischargers. EPA is in the process of setting industrial pretreatment standards for toxic substances. EPA's standards as well as the results of Metro's toxicant study will be used in establishing discharge limits for industries which are tributary to the Metro system.

January 13, 1980

Mr. Craig Partridge
EPA - Region 710
1200 - 6th Avenue
Seattle, Washington
Mail Stop #443

Dear Mr. Partridge:

This is a letter of protest for the proposed Metro project of ending the discharge of sewage effluent into the Duwamish River and piping it to Puget Sound instead. I attended the AIM meeting on January 6th and felt well-founded opposition was presented against the proposal.

As a long-time practicing pediatrician in Seattle with dedicated interest and understanding of public health and preventive medical standards for all the people, I feel that this proposal must not go forward.

We must think ahead to more than where we will pump out our growing sewage effluent. Although, it presents higher initial costs to build closed system sewage disposal plants, they will pay all the added costs and more with return on the recycled commercial fertilizers. The United States government would undoubtedly be our largest customer to help in the development of arid lands. The more refined sterilized effluent could be returned to local rivers without problems. ①

Please note that I referred to plant(s). There should be geographically strategic units built, so that the capability and reliability of the system would not be unduly taxed, in times of flooding, etc., by having just one enlarged plant at Renton.

Perhaps, the Department of Interior would be interested in being a partner in this concept and set a model for other states to follow in building for a better tomorrow for all.

Sincerely yours,

E. John Wollenweber M.D.
E. John Wollenweber, M. D.

cc: Metro Office, Seattle, WA.

Response to E. John Wollenweber Letter of January 18, 1981

1. Reuse concepts currently incorporated in the recommended facilities plan include recovery of methane gas from sewage sludge, and proposed land application and composting of digested sludge. Treatment of wastewater by advanced wastewater treatment (nitrification) was evaluated in facilities planning, and it was concluded that nitrification would create reliability problems and still would not eliminate risks to the Green/Duwamish River fishery. The effluent might be made still less threatening to aquatic life through implementation of additional advanced wastewater treatment processes, but the costs and energy requirements of such alternatives would increase substantially. Regarding decentralization, the final plan recommended program leaves open the option of building a Kenmore plant to treat flows from the north part of the study area.

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JAN 20 1981
ENVIRONMENTAL EVALUATION BRANCH

RECEIVED
JAN 20 1981
ENVIRONMENTAL [illegible]UATION

January 19, 1981

Paula E. Clark
16422 8th Avenue South West
Seattle, Washington 98166

EPA, Region X
1200 Sixth Avenue
Seattle, Washington 98101

Re: Renton 201 Study, Metro Wastewater Management

To Whom It May Concern:

The Draft Plan Summary begins with the following statement, "Water quality has always been vitally important to the residents of the Seattle/King County metropolitan area."

We are faced in this area with several alternatives of disposing of wastewater; as Metro has determined, this will be accomplished by either Alternative A3 (Point Pulley) or Alternative A5 (Alki Point). This involves discharging effluent, including heavy metals, into Puget Sound at either site A3 or A5.

I would like to express my concern with either A3 or A5 as sites, and most especially Point Pulley. My primary concern is water quality. I believe that disposing of effluent from the Renton plant will cause deterioration of the water quality in the Point Pulley area. The fish, shellfish and swimmers will all be continually exposed to the toxicants in the effluent. It will only be a matter of years before the levels will build up and cause major hazards to health. ① Especially of concern to me is that as the service area widens, it will become more convenient and "cost effective" to continue hooking up to Renton-Point Pulley tunnel, which will greatly increase the amount of effluent discharged into the Sound. Point Pulley area could conceivably become the dumping area for the Renton, Bellevue, Redmond, Kent, Auburn, Kenmore area. Considering that at this point most of the wastewater would be originating far north of Point Pulley, Alternative B1 might be a more cost effective plan to implement now. ②

Another factor in water quality, and one that is of major importance, is that at Alki, there is a shorter effluent residence time than at Point Pulley, due to the currents. Local residents at Point Pulley are all aware of the southerly direction of the current. With Commencement Bay in Tacoma as terribly polluted as it is, I do not feel we can allow ③

any further pollution to flow in that direction.

If selection is based on the cost of the project, I feel that the difference between costs of A3 or A5 is negligible. I do not believe that a 50¢ increase in the Metro charges is a hardship. ④

The last factor I would like to bring up, and one that is quite apparent to everyone, is the negative public feelings that Metro will and has encountered. As evidenced at the recent meeting in Burien, there will be great public resistance to putting the tunnel through any of the three proposed routes to Point Pulley.

I would like to encourage Metro to vote for Richmond Beach disposal (Alternative B1) or Alternative A1. Either of these plands, despite difference in cost, would be more ecologically sound, be of better public service and be of better long term use.

Sincerely,

Paula E. Clark

Paula E. Clark

cc: Metro Council

Response to Paula E. Clark Letter of January 19, 1981

1. See General Response Number 1.

2. Metro's recommended program retains this option.

3. See General Response Number 1.

4. EPA regulations require cost comparisons to be made on the basis of total present worth costs. The $66 million difference in present worth costs between Alternatives A-3/A-5 is significant in the aggregate, even if it would mean only slightly higher monthly rates for Metro customers.

January 21, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington

Dear Sir:

As a concerned resident of the city of Seattle, I am totally against the concept of pumping sewage from the county through the middle of our city. According to your draft Environmental Impact Statement two of your proposals involve transporting unclean waste water through five to ten miles of pipe to an outlet located in Puget Sound. Since the proposed routes travel through earthquake fault zones why wasn't any earthquake protection included into the design ? ①

Sincerely,

Robin Rolstad

Robin Rolstad
4613 48th Avenue South
Seattle, Washington 98118

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JAN 23 1981
ENVIRONMENTAL EVALUATION
BRANCH

Response to Robin Rolstad Letter of January 21, 1981

1. See General Response Number 7.

5000 S.W. Stevens
Seattle, Wa. 98116
January 22, 1981

E.P.A. Region X ✓
120 6th Avenue
Seattle, Wa. 98101

Cmd. Partridge
Mail Stop M-S 443
Seattle, Washington

Jeff Bauman
Metro
821 2nd Avenue
Seattle, Wa. 98104

Gerry Larrance
Metro
821 2nd Avenue
Seattle, Wa. 98104

Gentlemen:

Re: Draft Wastewater Management Plan
Lake Washington/Green River Basins
Renton 201 Study

We wish to go on record of strongly opposing the proposed sewage plan involving the tunneling through West Seattle and emptying effluent off Alki Point.

As long time resident of West Seattle (and our forefathers as well) we have enjoyed the beauty and environment of this area and wish to retain that quality.

The plan you have in mind will only encourage developers to forge ahead, leaving their problems to our area to overcome. If development is to take place in the east and south ends of King County, then consideration should be given for the consequences to be met by those responsible for their actions. Just don't foist those problems on us in this area. We have enough to contend with, without additional burdens of neighboring effluent. ①

Presently we are involved in the West Seattle Bridge project which will be with us for a couple of years. Also, West Seattle as you may know, is a potential earthquake area, and in 1964 we had definite proof of that. ②

We have no alternative plan to offer other than - not at Alki! With all the talent of available engineers, certainly some alternate plan could be used resulting in a better solution in the area involved.

Very truly yours,

Donald A. Haas

Donald A. Haas

Maxine D. Haas

Maxine D. Haas

RECEIVED
JAN 23 1981
[illegible] EVALUATION

Response to Donald A. and Maxine D. Haas Letter of January 22, 1981

1. Wastewater planning is regional in scope, similar to transportation. Metro, as the designated wastewater planning agency in this region, has determined that a centralized treatment system is preferable at this time and that Puget Sound is the most acceptable discharge location.

2. See General Response Number 8.

western union **Telegram**

SEB152(1553)(1-019046C022)PD 01/22/81 1649 1981 JAN 22 PM 1:52

ICS IPMSEUD SEA
03033 SEATTLE WA 139 1-22 1225P PST
PMS U.S. ATTORNEY
ROOM 1012
UNITED STATES DISTRACT COURT HOUSE DLV
SEATTLE WA

STATEMENT:

AT PUBLIC HEARING, BELLEVUE WASHINGTON, U.S.A., 21 JANUARY 1981, NO UNSOLICITED PUBLIC ACKNOWLEDGEMENT OF CHLORINE TOXICITY TO ENVIRONMENT FROM RENTON TREATMENT PLAND EFFLUX ON BEHALF OF REPRESENTATIVES FROM METRO SEATTLE OR FROM UNITED STATES ENVIRONMENTAL PROTECTION AGENCY OFFICERS (REGION TEN) IN THEIR PUBLIC ENCOURAGEMENT OF EFFLUX WASTEWATER DIVERSION TO PUGET SOUND FROM

---

western union **Telegram**

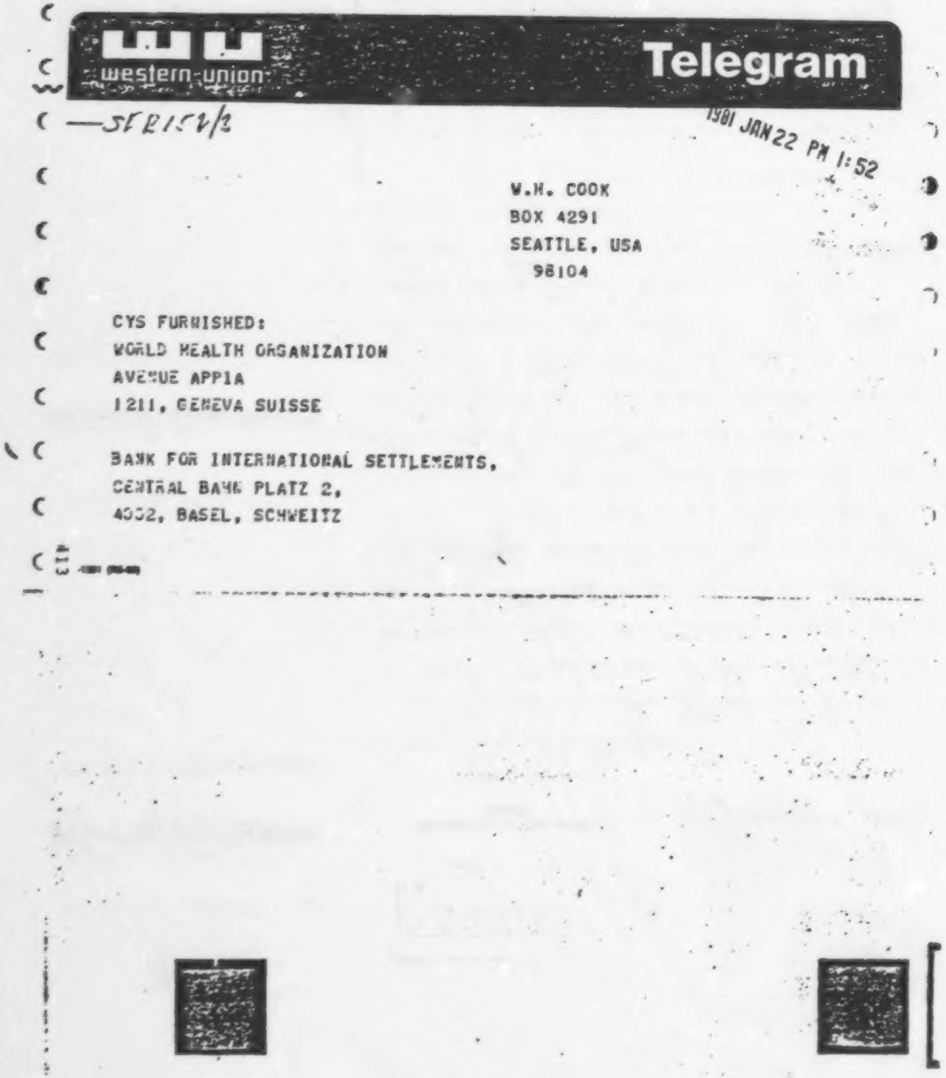
—SEB/SVW 1981 JAN 22 PM 1:52

ITS PRESENT EFFLUX INTO DUWAMISH RIVER.

IN ENVIRONMENTAL IMPACT SYNOPSIS FROM ENVIRONMENTAL PROTECTION AGENCY, NO STUDIES ON DIHALIDE ANION INTERACTIONS WITH BIOMOLECULES, AND NO SUGGESTION OF EFFECTS FROM RESULTANT ACCUEOUS ELECTRON FORMATION IN PUGET SOUND. ①

SUGGEST IMMEDIATE CESSATION OF CHLORINE GAS TO DISINFECT WASTEWATER UNTIL CURRENT TOXICITY LEVELS WITHIN IMMEDIATE REGIONAL BIOSPHERE ARE ACCESSED AND DISCLOSED TO PUBLIC.

RECEIVED
JAN 26 1981



western union

Telegram

—SEB152/2

1981 JAN 22 PM 1:52

W.H. COOK
BOX 4291
SEATTLE, USA
98104

CYS FURNISHED:
WORLD HEALTH ORGANIZATION
AVENUE APPIA
1211, GENEVA SUISSE

BANK FOR INTERNATIONAL SETTLEMENTS,
CENTRAL BAHN PLATZ 2,
4002, BASEL, SCHWEITZ

413

Response to W. H. Cook Telegram of January 22, 1981

1. See General Response Number 19 to Puget Sound Water Quality Committee letter. An alternative to chlorination for disinfection of wastewater would be desirable. Unfortunately, no cost-effective method presently exists. A great deal of research nationwide is currently being conducted toward this end.

RECEIVE
JAN 5 [illegible]

I

Jan 28, 1981

Dear Mr Partridge

My name is Norman Zeek of 8650 32nd Ave S.W., Seattle, 98126, a West Seattleite who is very disturbed over Metro's plan to dump additional sewage off Alki Point. It was downright insulting to us for Metro to make the statement that because we already had sewage dumped there, it was the natural thing to do to increase the polution off Alki, infering that we are second-class citizens as compared to the Normandy Park area.

① You people presented a lot of vague, general information; no one knew for sure what the impact would be on the area, if the sewage would move only

II

out in the middle of the Sound and to the North. Nothing was said what the incoming tide would do to dispersing the sewage or storms which tend to hold the water in the area. I am wondering about the validity of that impact statement you had when the experts at the Universit of Washington College of Oceanograph could not even tell us how or where the sewage would go.

② I was also disturbed at the comment made by Metro that the Normandy Park area also had a park. I suspect that Metro has not seen the park and suggest that they look at it before comparing it with the one at Alki.

I have seen both parks and believe I am correct in assert

III

that poluting the Alki park beach will damage the quality of life much more than poluting the beach at Normandy Park. That statement was just another inference of Metro of our supposedly second class status dedicated to become a dumping spot for sewage from newly developing areas which should be responsible for taking care of their own disposal problems.

③ I was also very much disturbed at your failure to consider the impact on property owners along or above the pipeline. Are we to believe that property owners were not affected on Ravenna Ave when the Ravenna trunk line broke and caved in the whole street.

IV

④ In closing, I sincerely hope you people will do some further analysis particular in the area of the impact on the quality of life at Alki. Lets express that quality in terms of dollars. Expressed thusly, it would seem to me that less damage would be done in placing emphasis on developing a treatment plant capable of handling the problem locally.

Sincerely
Norman Zink

Response to Norman Zenk Letter of January 28, 1981

1. See General Response Number 1.

2. No discharge is contemplated at Normandy Park. Seahurst Park is the referred discharge location. No direct significant impacts to the beach are predicted, although perceptual impacts may exist.

3. See General Response Number 8. As to the Ravenna tunnel cave-in, the Ravenna tunnel and proposed Renton tunnel are not comparable. The Ravenna tunnel was of brick and mortar construction and was built by the City of Seattle in the early 1900s. The brick and mortar was very susceptible to attack by hydrogen sulfide corrosion which weakened the tunnel, resulting in its collapse. Modern tunnel construction techniques eliminate the possibility that a "Ravenna cave-in" might occur in the Renton tunnel. In addition, the effluent tunnel should not experience a hydrogen sulfide corrosion problem because the effluent is well oxygenated, compared to the raw sewage transported in the Ravenna tunnel.

4. See General Response Number 8.

RECEIVED
JAN 30 REC'D
EPA-EIS

16525 Maplewild Ave. SW
January 28, 1981

Dear Environmental Protection Agency,

Please protect our environment, on Three Tree Point.

① We don't want either the tear-up of our hills, roads, and homes or the sewage from Renton going out here near us and our populous beaches.

② Please either expand and upgrade Renton's own plant so they can take care of their own sewage, or pipe it out the Duwamish to Elliot Bay where no local residential neighborhoods are wrecked & where currents will flush it all out north quicker & safer.

Rita & Greer Nielson

Response to Rita and Greer Nielson Letter of January 28, 1981

1. The Final EIS in Chapter 6 recognizes adverse impacts of construction of the Seahurst Park tunnel/outfall, and presents mitigation measures to reduce the severity of these impacts.

2. These alternatives were evaluated in the Wastewater Management Plan and EIS. Nitrification of effluent at Renton still would not afford complete protection to the Green/Duwamish River fishery. An Elliott Bay discharge is more costly than a Seahurst Park discharge, and Elliott Bay has poorer dispersion characteristics than the open waters of Puget Sound.

January 31, 1981
Subject: Draft E.I.S. for
Wastewater Management
Plan for the Lake
Washington Green River
Basin

RECEIVED
FEB 4 1981
ENVIRONMENTAL EVALUATION
BRANCH

Roger K. Mochnick
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, Washington 98108

Dear Mr. Mochnick,

Having reviewed your Environmental Impact Statement, I feel there are some deficiencies that should be corrected in the final E.I.S. Your contention that Alternative A-1 would harm salmonid migration by raising the water temperture or lowering dissolved oxygen level is not substantiated by any data. ① Also why couldn't the effluent discharge be cooled by refrigeration during periods of low flows in the Duwamish? Couldn't the requirement point s ource treatment for discharging heavy metals lower the discharge of these materials to meet D.O.E. standards? ② Why couldn't paddle wheel oxygenators like those used on the Thames River in England be used on the Duwamish River to raise the levels of dissolved oxygen? Wouldn't the eliminacion of the sewage discharge increase the salt water intrusion up the Duwamish River during periods of low river flow and wouldn't this hurt juvenile salmonids in the river? ③ More evidence should be given in the final E.I.S. in order to justify eliminating alternative A-1, especially when it is the most economical solution.

Inadequate soils data is given to determine the cost of boring a tunnel for alternatives A-3 and A-5. A soils profile may give a general idea of the conditions expected, but without more extensive investigations, unexpected conditions might ④ double or triple the cost of the tunneling. Without Federal Aid that might result in th doubling or tripling or sewer rates for people living in areas who wouldn't even contribute sewage to the system.

Alternative A-1 would have less unexpected costs because it is on a smaller scale with fewer unknowns. We do not want ano ther WPPS.

Since business, commercial and high density residential development have resulted in the need for a larger sewage system in the area, why shouldn't the developers ⑤ of these businesses pay a proportionately larger share of the costs for these improvements? Also, won't these sewage improvements actually incourage unplanned development?

The Environmental Impact Statement for this project is an attemot to substitute an administrative decision with only a limited acount of public input, for a political decision that should involve the local public officials and a public ⑥ referendum. The question is not how the metro rate payers should pay for these improvements but whether the rate payers should pay for these improvements. Especially since you may have already eliminated the best alternative (A-1) and don't have a firm estimate of what your recommended alternative will cost.

I hope that the reviewing federal agencies will judge the present draft E.I.S. as inadequate, and will not give approval of the final E.I.S. until a better job of research is done to answer the questions raised and reduce the numbers of unknowns.

Page Two

Since our children will also be paying for this decision, we must make sure it is not made hastily and that it is the most cost effective one possible.

Sincerely,

Jay La Vassar

Jay LaVassar
702 West Cremona
Seattle, Washington 98119

Response to Jay LaVassar Letter of January 31, 1981

1. There are essentially no data that positively demonstrate that present temperature and DO regimes harm salmonid migration in the Duwamish River. The general temperature and DO criteria for delaying migration are derived from studies of other river systems. Sampling the precise triggering of upstream migrant salmonids through the estuary would be expensive and difficult. Additionally, there is probably some variability in the response of the fish to temperature and oxygen, i.e., the temperature and DO criteria are not absolute thresholds which positively block fish migration.

2. As to heavy metals, concern about heavy metal concentrations in the Renton treatment plant effluent is not the basis for recommending that the effluent be diverted to Puget Sound. Even if heavy metals were totally eliminated from the effluent the diversion to Puget Sound would still be required to address ammonia toxicity, reliability concerns, chlorine toxicity, dissolved oxygen levels, temperature levels, and wastewater dilution ratios.

As to alternatives to diversion to Puget Sound, although a full range of alternatives was considered, there is no cheaper solution to solve the problem. Alternatives considered include such things as in-river aeration, fish bypass structures, in-river chemical treatment, seasonal storage, seasonal land application, in-stream flow augmentation, direct fisheries enhancement in the event of fish kills, and others. These alternatives were either infeasible, more expensive or too unreliable. There seems to be no practical alternative to diversion to Puget Sound or advanced waste treatment.

3. See General Response Number 3. The Final EIS contains additional analyses of effluent removal from the river. The effluent is more of a detriment than a benefit to juvenile salmonids due to the ammonia in the effluent.

4. See General Response Numbers 11 and 15.

5. See General Response Number 12. Regarding growth inducement, the EIS analysis indicates that the proposed sewer service area is consistent with local land use plans and policies, and service would therefore only be provided to areas currently planned for development.

6. The Metro Council, consisting of local elected officials, will make the final local decision as to which, if any, project will be proposed for federal and state funding.

1-31-81

ROGER K MOCHNICK
ENVIRONMENTAL EVALUATION BRANCH
U.S. ENVIRONMENTAL PROTECTION AGENCY
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

RECEIVED
FEB 4 1981
ENVIRONMENTAL EVALUATION BRANCH

DEAR MR MOCHNICK

IN REVIEWING THE EIS OF THE WASTEWATER MANAGEMENT PLAN (DRAFT) FOR THE LAKE WASHINGTON/GREEN RIVER BASINS I HAVE THE FOLLOWING COMMENTS :

1) PAGE 32 NOTES IN TABLE 2-5 ITEMS 19 AND 20 KCWD #82 & KCWD #121 ; EFFECTIVE NOV 21 1979 KCWD #121 MERGED INTO KCWD #82. HENCE THERE IS NO KCWD #121. ①

2) PAGE 45 ENDS IN MID-SENTENCE PAGE 48 IS BLANK - WHAT DID YOU SAY ? ②

3) PAGE 157 4TH ¶ SAHALEE IS NOT A WATER DISTRICT. IT IS A SEWER DISTRICT ONLY AND A PRIVATE WATER COMPANY (ALSO IN ¶ 5 ON PAGE 157) ③

4) ITS TOO BAD ALL YOUR FIGURES THAT ARE MAPS ARE UPSIDE DOWN. YOU DON'T NEED TO FOSTER THE CONCLUSION THAT SOME PEOPLE DRAW FROM THIS. ④

YOURS VERY TRULY
ROBERT A. NOVA
PRES KCWD #82
19604 SE 31ST PL ISSAQUAH 98027

Response to Robert A. Nova Letter of January 31, 1981

1. This correction has been made in the Final EIS.

2. In the Draft EIS, page 45 text continues on page 48. The commentor evidently received a defective copy of the Draft EIS, because text was present on page 48. (Note that these page numbers have changed in the Final EIS.)

3. This correction has been made in the Final EIS.

4. The maps are intended to be read by turning the document 90°, so that north is on the reader's left.

RECEIVED
FEB 2 1981
ENVIRONMENTAL EVALUATION
BRANCH

February 1, 1981

RE

EW.

EPA
Region X
1200 Sixth Avenue
Seattle, WA 98101

Attention: Roger Mochnick M/S 443

Dear Sir:

We are rushing this written comment to you so as not to miss the February 2 deadline as we have missed information on all public workshops and heard only a bit of the public hearing January 21 in Seattle.

We strongly oppose any discharge of effluent to Puget Sound at the Point Pulley (Three Tree Point) area. Our immediate reaction was just keep it away from the Seahurst Park outfall, but after investigation, we believe any of the three Three Tree Point outfall sites would be detrimental to the waters and beach at Seahurst Park and every private beachfront from Three Tree Point northward in nearby coves, not to mention the harmful effect of such discharge to mainland beach and water south of the Point, including Tacoma and Commencement Bay, where NOAA has recently confirmed fish contamination, and Maury and Vashon Islands. ①

Alternative A-1 to expand the existing Renton treatment plant and increase the level of treatment to advanced secondary and continue to discharge treated wastewater into the Green/Duwamish River would be our preferred program or else piping effluent down the Duwamish. This is the least costly of the alternatives, per your cost estimates. Also if the proposed dredging of the Duwamish for ship traffic further up the river should occur, and we believe this is going to occur when the new West Seattle bridge is constructed, the additional water would then be needed in the river. ②

-2-

We are totally against Metro crossing miles through an area it does not even serve, and dumping effluent into Puget Sound waters off areas it also does not even serve.

Studies of effluent dispersion from the West Point outfall show that in summer. effluent is present on the beach (pages 2, 62-63, Puget Sound Interim Studies, Dispersion of Effluent from the West Point Outfall, Applied Physics Laboratory/University of Washington, February 1976, Final Report. On page 2, 1.1 Sampling Plan, paragraph 2, Puget Sound Interim Studies, Demersal Fishes Near Metro Sewage Treatment Plants and in the Duwamish River, Fisheries Research Institute, College of Fisheries, University of Washington, Final Report, June, 1977, a move of the sampling sites was justified "since studies by the Applied Physics Laboratory (1975) and Evans-Hamilton, Inc. (197'), had shown that effluent from the (West Point) outfall reached both the north and the south beaches." ③

Since "no major impacts expected" on Puget Sound is written in EPA's Metro Wastewater Management/Summary Draft Environment Impact Statement and has been re-stated at meetings, such as January 27, at the Burien Southwest Suburban Sewer District meeting, you must consider the presence of effluent in summer on the beach as not a major impact. When was the last time you and your family went swimming in effluent! Thousands of people swim and play in Puget Sound along the beaches north of Three Tree Point, including King County's Seahurst Park during the summer.

The area north of Three Tree Point is cove shaped. We have personally witnessed each summer the accumulation of a drift line of debris that stays intact from storm to storm and slowly drifts from thousands of feet out, to coming completely into and remaining on the beach. The surface waters of this cove are very quiet during the summer and any effluent that came to the beach would stay in the area, thus creating a build-up until some turbulance (a storm) stirred the waters again, weeks or months later.

"During the late spring and summer, the possibility exists that juvenile salmonids and other species which exploit the nearshore environment around West Point may be adversely affected by wastewater entrained into nearshore shallow waters by inshore eddies" page 75, #3. Puget Sound Interim Studies, Demersal Fishes Near Metro Sewage Treatment Plants and in the Duwamish River, Fisheries Research Institute, College of Fisheries, University of Washington, Final Report, June, 1977. We maintain the same conditions would exist around the Seahurst Park area. We eat the fish and crab caught in this area. We aren't willing to take a chance on adversely affecting sea life in this area. Humanity itself is in danger when we contaminate the food cycle.

It does seem that something should be done to preserve fishes and improve water quality in the Duwamish, but not by dumping the problem from one area (Duwamish) to create another problem area (South Puget Sound). We urge you to further treat sewage at the Renton plant to advanced secondary (nitrification), alternative A-1.

Sincerely,

Adolph I. Moum

Mr. and Mrs. A. I. Moum
12801 Stamiring Lane S. W.
Seattle, WA 98146

Response to A. I. Moum Letter of February 1, 1981

1. See General Response Numbers 1 and 2.

2. See General Response Number 3.

3. See General Response Number 1. As to the West Point effluent reaching beaches, the interim studies did report instances when it appeared that West Point effluent, in very dilute concentrations, had reached adjacent beaches. But even in the event that diluted effluent does approach the beach, no adverse impact to beneficial uses occurs.

THE GIDEON KRAMER ASSOCIATES • 206 THIRD AVENUE SOUTH • SEATTLE WASHINGTON 98104 • 206-623-0676

February 3, 1981

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Attention: Roger Mochnick M/S 443

We are property owners on the South beach of Point Pulley.

We have made a considerable financial comittment to bring about an improvement in the water quality of Puget Sound and particularly of our area, and are ready to support any effort to improve the water quality of our greater region which we assume is the intent of Metro's Lake Washington/Green River Basin program.

It is important to recognize that because of the underwater ledge across Admiralty Passage, the lower stratas of Puget Sound must be considered a closed system. Non biodegradable materials that settle to these lower stratea will accumulate and be permanently retained in Puget Sound.

The proposal to divert inadequatly processed effluent to Puget Sound and especially to a Point Pulley outfall is not acceptable to us. ①

We trust you value our continued support and that your final decision will be consistant with your declared concern for improved water quality for ALL people of this area, including those of Point Pulley, Tacoma, Olympia, and all of the residents of lower Puget Sound.

Respectfully,

Gideon Kramer

Ruth Kramer
Ruth Kramer

2401 S.W. 172
Seattle, 98166

RECEIVED
FEB 4 1981

Response to Gideon and Ruth Kramer Letter of February 3, 1981

1. See General Response Number 2.

KAPPA ALPHA THETA FRATERNITY
GRAND COUNCIL

MRS. KARL H. KLOPFENSTEIN
3750 S. W. 171st ST
SEATTLE, WA 98166

Roger/Craig

RECEIVED
FEB 9 1981
ENVIRONMENTAL EVALUATION
BRANCH

February 5, 1981

EPA
Region X
1200 Sixth Avenue
Seattle, Washington 98101

ATTN: Roger Mochnick M/S 443

Dear Mr. Mochnick,

This letter is to advise you that my husband and I are vehemently opposed to your bringing any kind of sewage disposal plan to the Three Tree Point/Point Pulley location.

We were able to attend your meeting which was held Tuesday, February 3rd and I must agree with the lady from Vashon Island that your initial publications were designed to gain as little attention as possible. In fact we did not ever receive notification of meetings through the mail. I consider this a typically, despicable approach of our bureaucracies of today. Mr. Fleming is correct - You are looking for " a cheap, quick fix"! I hate being conned. ①

How Metro can consider spoiling the South Sound, which does not have the right currents, and making a move to harm the property values of thosaresidents in this particular area is beyond me. I think it is dreadful that one can't purchase a piece of property, maintain a home and pay continual increasing taxes without being harrassed with the problems of the East Side sewerage. It is unbelievable that an agency such as Metro has the power to make decisions which effect so many innocent citizens. Let the East Side handle their own problems! ②

We do not want tunnel construction, easements nor a pump station of ANY KIND in this area! This is a residential area - why don't you consider a pump station on Hunts Point? On Evergreen Point! ③

Dinah Klopfenstein

Response to Dinah Klopfenstein Letter of February 5, 1981

1. See General Response Number 14.

2. See Response Number 1 to Haas letter.

3. A number of alternative discharge locations were considered and evaluated in the Wastewater Management Plan and EIS. After considering the various trade-offs among the alternatives, discharge off Seahurst Park was recommended in Metro's final plan.

February 12, 1981
16303 Maplewild Ave. S.W.
Seattle, Washington 98166

RECEIVED
FEB 13 1981
ENVIRONMENTAL EVALUATION
BRANCH

Environmental Protection Agency
Region X M/S 443
1200 6th Avenue
Seattle, Washington 98101

Attn: Roger Mochnick

Gentlemen:

I have attended two of your neighborhood information meetings wherein the proposed routing of the waste-water from the Renton Valley Metro system is suggested to be dumped in the lower Puget Sount area, south of Alki Point.

While I am sympathetic to the necessity of dispensing the secondary treated sewage that accumulates in the Renton valley, and that Puget Sound is a logical place to rapidly dilute this waste water if placed in the sound at the proper point, I am emphatically opposed to any plan that will allow the fall out to flow into the south sound below Alki Point, by tidal action, around Vashon Island before it finally flows North out of the sound.

My reasons for these comments are:

1) The tidal action is very sluggish from Alki Point south to Tacoma, whereas from Elliot Bay north, out of the sound, the tidal flow is much more pronounced and regular. ①

2) The South Sound is burdened already with the S.W. Sewer District, Normandy Park, Des Moines, Tacoma, and many other smaller systems extending the Shelton-Olympia area to Vashon Island. ②

3) The rapidly developing residential areas from Lynnwood to Auburn which collect at Renton will put increasing demands for run-off that I am not convinced has been accurately estimated in this initial study. Establishing an underground tunnel to dump this water below Alki Point, based upon the inadequate study and unknown volume of future sewage from the Renton Valley, will only lead to a plea to increase the volume, or build still another tunnel in the near future. ③

4) Very little is known about the geophysical status of the underground structure of the soil, and the estimates for constructing such tunnels may well be many times the projected costs in this study. Underground rivers and sand deposits can make such a project many times as expensive as constructing a pipe down the Duwamish River and directly out into Elliot Bay where the sewage can move out of the sound. ④

5) The property values of the Seahurst Park, Three Tree Point Point Pulley, Normandy Park, and Des Moines, would be materially affected by a major sewer dump that is proposed in this study. The beach areas would be continually suspect for being suitable for water recreational activities. ⑤

6) To foist the economic problem of having to charge a few more cents, or even dollars, per residence to those dependent upon the Metro sewage system, on either the residents of the South-Sound, or for that matter, to burden the ecological structure of the entire lower sound, is in itself an expedient way to solve the problem. Why not face up to the problem today and do it right?

7) Of all the alternatives proposed, the choice of the lower-sound will have the most deliterious effect upon the people in general, and upon the long range balance of the eco-systems of Puget Sound. ⑥

8) In my opinion man should "Bite the bullet" today, and if necessary construct disposal plants that will put the water back on the earth in a pure state. It would seem that man can do anything he thinks of, and it is time to put some thought to this problem rather than take the easiest way out.

I, for one, will take every measure possible to resist any effort to dump the Renton Valley sewage waste water in the lower-sound.

Very truly yours,

Myron B Savage

Myron B. Savage

xc: Gerry Larrance
MS 73 METRO
821 2nd Avenue
Seattle, Wash 98104

Response to Myron B. Savage Letter of February 12, 1981

1. See General Response Number 1.

2. See General Response Number 2.

3. See Response Number 4 to Jeanne L. Snell letter.

4. See General Response Number 11.

5. See General Response Number 8.

6. The final plan recommended program was selected after a careful consideration of impacts of various long-term alternatives. Certain adverse impacts of the recommended program are predicted in the Final EIS, and mitigation measures have been proposed to avoid or reduce these impacts. The costs of making Renton effluent "pure" would make this alternative economically infeasible, because the incremental costs of removing the last pollutant concentrations in effluent increase dramatically.

February 12, 1981
16303 Maplewild Ave S.W
Seattle, Wa., 98166

Environmental Protection Agency
Region X M/S 443 ②
Seattle, Wa. 98101

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FEB 13 1981
ENVIRONMENTAL EVALUATION
BRANCH

Attn: Roger Mochnik ③

Gentlemen:

I am sharing with you my concerns about Metro's ④
plan to outfall treated sewage water at the Pt. Pulley/
Seahurst area. I find the decision to be contrary to their
stated goals: to insure water quality, protect public ⑤
health, support land-use plans, is financially sensible

Local sewer districts (non Metro) are presently using
this area for treated outfall. This outfall is primarily
residential and does not contain the industrial (heavy) waste
the Metro outfall would bring. This outfall might be
① environmentally damaging to an area of water which for three ⑥
generations has been used as a human and fishery habitat
the use being recreation (swimming) and food gathering (fishing).
Commencement-Bay is already polluted and the bottom fish
are diseased. Studying the model of Puget Sound at the
Pacific Science Center, I observed that there is a very
shallow, narrow area before the entrance to Colvos
Passage (the route of the South flowing water from
this area). I'm concerned about how much pollution
would occur here with such a large outfall proceeding
south. The E.P.A. states it has not studied the effect of the
higher temperature of the water in the South Sound as
compared with the very cold water at West Point. What
effect would the narrower passage between the Seahurst
Pt. Pulley area and Vashon Island (three miles) in contrast
to the relatively wide channel between land mass
West of Elliot Bay? We have been informed that if
the City of Seattle would dispose of its storm-sewer run-off
appropriately, West Point would have a larger capacity
for sewer out-fall. There are studies from N.O.A.A.
to indicate possible circulation problems in this area.

As to public health, this area is a human
habitat and a fishery habitat. It is 99% residential,
with some parks and marinas. The use of the water
here is entirely for recreation, swimming, water-skiing
with much direct body contact and food gathering
fishing. For three generations young children literally
live in this water five months of the year, the youths
snorkel, scuba dive and water ski. The people who
have made this investment are providing a habitat
for their young. Should one group provide itself a social
benefit (waste-disposal) at the expense of another's choice
social survival. If we are unable to use this water

safely, will society need to provide (money) for our children.

The land (and water) use in this area, Pt. Pull Seahurst, Normandy Park and Des Moines, has been established for at least three generations. This entire waterfront is residential. There is ongoing remodelling of older homes and the building of new ones on old sites. In one mile of this waterfront there are homes whose value is greater than the difference in cost between the low-cost A-3 plan and any of the other Metro plans. The land and homes here are prime real estate. Citizens living here have chosen to invest a large proportion of their assets in this site in order to benefit from this unique habitat.

⑦ Cheapest is often the most expensive. There are millions of dollars worth of homes here whose value would most certainly be depreciated by bringing the entire Eastside outfall into this area.

⑧ A present member of S.W. sewer personnel has stated that there are so many underground rivers under the Burien area that tunnelling would be an impossibility. A plan that is questionable in view of Metro other goals, water quality, public health and land use, that would save Metro users from five to seven dollars a year per household is not financially sensible.

⑨ I would like to see the outfall from the Renton plant piped down the Duwamish, piped through Elliot Bay to the main north-flowin channel. I see this as the least disturbing to the human and fishery habitat. It wo fulfill Metro's four goals. The extra cost wo be less than a sack of groceries or a tank of gas per year to a Metro user.

It is my opinion That plan A-3 (Pt Pull Seahurst outfall) is contrary to common sense. I intend to join any community compact to opp it legally.

Sincerely,
Beth Savage.

copy: Gerry Larrance
MS 73 Metro
821 - 2nd Ave
Seattle, Wa. 98104

Response to Beth Savage Letter of February 12, 1981

1. See General Response Numbers 1 and 2.

2. The temperature of Puget Sound at West Point vs. the south sound is not expected to be a significant factor with regard to effluent effects.

3. The significance of the differing widths of these channels is not known. However, tidal currents are generally stronger in the West Point area than near Three Tree Point. The Final EIS has compared oceanographic conditions between Alki Point and Three Tree Point (Chapter 6).

4. The question relates to wastewater flows from the North Lake Washington and North Lake Sammamish basins and whether these flows should continue to receive treatment at the West Point treatment plant. As discussed on pages 54 and 55 of the Final Plan, Metro intends to resolve this issue as it finalizes its plans for the West Point treatment plant. If the remaining capacity at the West Point treatment plant is fully utilized it is technically possible to continue to accept the North Lake Washington and North Lake Sammamish flows. CSO control would not provide any additional dry weather capacity at West Point. In terms of wet weather flow, additional CSO control could be used to reduce the volume and/or incidence of CSO's but would probably not provide additional wet weather capacity.

5. NOAA charts show slower current velocities near Three Tree Point than near Alki Point, as indicated in the Final EIS (Chapter 6).

6. See General Response Number 1.

7. See General Response Number 8.

8. Metro's consulting engineer considers tunnelling under the Burien area to be feasible.

9. This alternative has been evaluated in Metro's Final Plan. It is more costly than either the Alki or Seahurst Park outfalls, would have extreme construction impacts, and may not provide significant environmental benefits.

15911 S.E. 177th Street
Renton, WA 98055

February 15, 1981

Roger K. Mochnick M/S 443
Environmental Evaluation Branch
U.S. Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Dear Mr. Mochnick:

Attached is a copy of a letter sent also to Metro in response to the Draft Plan and EIS for the Wastewater Management Study for Lake Washington/Green River Basins. Please accept this as my comments to the EIS also.

Sincerely,

Wayne J. E. Lamm

Wayne J. E. Lamm

Enclosures

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FEB 17 1981
ENVIRONMENTAL EVALUATION
Branch

15911 S.E. 177th Street
Renton, Washington 98055

February 15, 1981

Ms. Gerry Larrance
Municipality of Metropolitan Seattle
Community Involvement
821 Second Avenue
Seattle, Washington 98104

Dear Ms. Larrance:

I thank Metro and EPA for this opportunity to make comments on the draft plan and EIS for the Wastewater Management Study for Lake Washington/Green River Basins. I realize the considerable effort that has been involved in preparing these studies, by all parties, therefore I make the following comments to enhance this effort in the final plan. I have served on the Citizen Advisory Committee that has reviewed this study from the beginning. My views are expressed as a concerned citizen and personally as an environmentalist.

GENERAL COMMENTS AND CONCERNS

Although this study includes only a part of the total area served by Metro, there is a basic lack in explanation of how this plan and the facility improvements indicated fit into the General Comprehensive Plan for wastewater management areawide. Many of the decisions to be made in this study are influenced by areawide decisions such as sludge disposal, closure of obsolete plants, CSO plans, limitations to the West Point plant, and equitability in the rate structure. There is a recognized need to move forward with expansion, to some degree, of the Renton plant but this should be considered as a part of the Metro overall wastewater management of the Puget Sound area.

I commend the decision of Metro in moving the effluent out of the Green/Duwamish River and directly into Puget Sound. This can only enhance the water quality of this valuable river. Furthermore, I totally support the strong position Metro has taken in considering only the designated sewer area in its facility plans, thereby allowing local land use areas to decide their own growth rate and density. The measures proposed by Metro to insure on-site systems as a permanent waste treatment possibility are steps in the right direction.

SPECIFIC ISSUES AND CONCERNS

(A) How this study in general and each of the alternatives considered fit into the areawide comprehensive plan of Metro should be an integral part of this document. The interrelationship of various factors should be discussed in detail. ①

(B) Although sludge disposal is currently being examined in a separate study, the lack of information makes consideration of several of the alternatives listed difficult to assess. The final plan should address the effects of likely disposal ② methods on each of the alternatives. Impacts as to truck traffic, pipelines, land application, plant facilities, and remoteness to application sites need at least be evaluated.

(C) The recommendations for Wastewater Management in currently Unsewered Areas (p. 78-82 of the Draft Plan) represents an important program that may in the long run do more to enhance water quality in the region than all of the expanded sewer facilities planned. The importance of this program to succeed is sufficient to recommend that EPA require written guarantees, from all agencies involved in the fulfillment of this program, as to their commitment to carry out their responsibilities before any grant money is given for the expansion of sewer facilities. ③

Particularly: (1) I would like a statement added to Section A. 1) (p. 79 Draft Plan) since failure of community systems are potentially more disastrous than individual on-site systems. "Community systems should be inspected by the regulating agency at yearly intervals and legal responsibility for the long-term maintenance and performance of the system be shown in writing by the builder/developer before approval of such system is given." (2) Section C (p. 81 Draft Plan) For the long-term financial protection of the person, who is willing to consider alternative waste water technologies and make them work (such as dry systems), allowances should be made by Metro and local sewer districts which do not force hook-up to a new sewer line if sewers are deemed necessary to bail out neighboring failing systems. ④

Optimally I feel that Metro should push for water conservation and dry systems throughout the service area as fresh water becomes a limited commodity.

(D) Preferred Alternatives

Metro has indicated in its Draft Plan that A3 (Pt. Pulley discharge) and A5 (Alki Pt. discharge) are the two preferred alternatives. Metro and EPA have stated that the Alki Pt. discharge would be the better of the two from a water quality standpoint with its reduced residences time for effluent in the Sound. Does this water quality benefit justify the extra $78 million to discharge at Alki Pt.? I feel that it does in view of the fact that the real difference in cost is not near so great when taking into account other areawide programs. ⑤

In the Preliminary Plan for this study (p. 25), the possibility of using the tunnel along the Duwamish as a temporary solution to controlling storm water overflows (CSO) was stated along with an estimated savings of $50-75 million over conventional control methods. On Page 26, a $10 million savings is noted for the phasing out of the Alki plant by including a reverse flow tunnel within the proposed Alki tunnel from the Renton waste treatment plant. Furthermore, in the Draft Plan, the A-5 present worth value is always overstated by $12 million (p. 73) since it includes a larger tunnel to accomodate the Alki reverse flow tunnel. Yet another indirect benefit is possible with the A-5 alternative by sharing some construction cost with a proposed Duwamish treatment plant (p. 27 of Preliminary Plan). No actual money figures could be given but the potential for substantial savings is there. ⑥

For a true comparison between the two alternatives in the final plan, these specific issues must be addressed:

(1) Comparison of alternatives for handling equal volumes of wastewater (i.e., Alki tunnel cost only for what would be necessary if it was the size of the Pt. Pulley tunnel). ⑦

(2) Fig. 2-29 in Draft Plan show the following changes:

(a) Route D and Route E: Gravity sewers-120 in.
(b) Tunnel-fully footnoted to explain the reason for the increased size and relation to stated cost. ⑧

(3) All associated benefits through CSO, plant closure, new plant construction must be evaluated. A revised comparison of cost for A-3 and A-5 based on these savings. ⑨

(4) An environmental statement detailing the short-term effects of construction along the Duwamish river and of all tunnels considered in the plan. ⑩

(5) The most current data on currents, resident times, etc., in the Puget Sound for all outflow locations. There should be included maps, charts and tables that the general public can evaluate. ⑪

(E) Equity Issue

There is a rising concern in the general public as to who is going to pay for new facilities dictated by the growth in population. Will the new people pay their share? Will one area be burdened again with facility cost which do not serve them directly? The Draft Plan has totally neglected this issue even though this concern has been raised repeatedly at workshops and hearings. Again this points to the need for this study to be viewed in respect to the areawide plan for wastewater control. ⑫

The equity issue is complex and may require a complete study on its own, authorized by the Metro Council. Regardless of this, the financial aspects of this plan should be presented in terms that will indicate sources of money and the benefactors of facilities planned. I have listed only a few of the specific items and factors that need be presented in the final plan.

Specifics

(1) New facilities and improvements should be separated by those necessary to maintain present service versus those required by increased growth. Many factors would need be considered in dealing with this issue, such as depreciation, replacement, common facilities, and areas served. ⑬

(2) Similarly, estimates as to the amount to Metro each category would contribute should be presented. Since rates charged at present are all the same, categories must include groups throughout the areawide service area. Comparison then should be made as to services rendered and fees paid for people in each category.

(3) The incremental increase in sewer rates due to implementation of each alternative needs a much better explanation. Is it a mean of the rate increases over the next 20 years? If so, is it expressed in present day value? How does this increase occur over time? This rate increase for each alternative would be much better understood from a graph showing the rate (present worth value) versus the next 20 years. Major factors (i.e., phase I & II) affecting the rate level should be indicated on the graph. Population estimates may also be valuable to plot. ⑭

(4) Evaluate several means of raising money for expansion besides the simple rate increase (i.e., building permit fees, hook-up charges, developer fees, variable rate structure, etc.). With the rising interest rates on bonds, Metro should consider the advantages of "upfront" charges in reducing total financing costs. ⑮

(F) Interim Measures

To reduce the impact on the Duwamish river, Metro should implement its cost effective measures to reduce the load on the Renton plant until Phase I is complete. West Pt. should be used to its fullest capacity. Even if the Redmond connection is built by not activating it. A moratorium on new hook-ups and delaying extension of interceptors should also be imposed, if deemed necessary. ⑯

SUMMARY

The urgent need for the expansion of the Renton treatment plant is recognized but the lack of necessary data being collected in ongoing studies (i.e., toxicant, sludge, and Puget Sound water quality) makes major decisions premature. Many of the issues raised in this study need to be considered in an areawide approach. I urge that Metro and EPA resolve the issues of concern to the public in the final plan. ⑰

Sincerely,

Wayne J.E. Lamm

Wayne J. E. Lamm

Response to Wayne J. E. Lamm Letter of February 15, 1981

1. The "preferred facility plan" for the Puget Sound treatment plants (January 1979) was used to guide the Renton 201 study. Recently members of the Metro Council have indicated an interest in restudying portions of the preferred facility plan for the Puget Sound plants. In response to EPA's decision on Metro's waiver application, Metro staff will finalize the Puget Sound facility plans and EIS. At that time the Metro Council will have the opportunity to reconsider prior conclusions concerning the West Point system. Changes in the recommended plan for West Point could impact the long range program for the Renton treatment plant. But the near-term need for Renton expansion to 72 MGD with solids processing and effluent diversion is needed in any event. This issue is discussed in greater detail in Chapter 3 of Metro's final Facilities Plan.

2. See General Response Number 5.

3. EPA recognizes the importance of the recommendations for improving the performance of on-site systems in the non-sewer area. Not only will improved performance help protect surface water and groundwater, it will also help prevent unnecessary public expenditures for sewer systems. EPA is formally recommending that Metro take every available action to ensure that needed recommendations are implemented by appropriate authorities. Specific decisions on which recommendations will be most effective are the responsibility of the local implementing agencies.

4. A management program is required prior to approval of any community on-site system. The comprehensive management program should require routine monitoring to assure that the system functions properly. Routine maintenance is another important element of the management program. The frequency of inspection depends on the type of community system, waste load projections, and on local soil conditions. The inspection schedule should be developed on a case-by-case basis as part of the management program for a particular community system.

Regarding local sewer hookup policies, the decision rests with local sewerage agencies and also depends on the hookup policies of the local health department. Current policies do require that residences hookup to adjacent sewer lines.

5. See General Response Number 1. The Final EIS indicates that no major water quality impacts are expected at either discharge location.

6. See Response Number 7 to PSCOG letter of January 8, 1981. Also, see General Response Number 9.

7. See Response Number 21 to Puget Sound Water Quality Committee letter. This change has been made in the final plan and Final EIS.

8. See Response Number 21 to Puget Sound Water Quality Committee letter. Also, see General Response Number 9.

9. See General Response Number 9.

10. Additional detail regarding the environmental impacts of constructing the tunnel/outfall to Puget Sound has been provided in the Final EIS, and additional mitigation measures have been proposed.

11. See General Response Number 1.

12. See General Response Number 12.

13. See General Response Number 12.

14. See General Response Number 10. Also, see Response Number 8 to City of Bellevue letter.

15. Metro has determined that sewer rate increases are an essential means of repaying the revenue bonds which are sold to finance the local share of projects.

16. See Response Number 9 to Citizens Committee for Clean Water letter of February 16, 1981.

17. Although additional studies and decisions will be made in the future that relate in some way to the Renton plant, EPA believes that the results of these studies and decisions will not affect the choice of an appropriate discharge location for Renton effluent or the decision to expand the Renton plant to 72 MGD capacity.

13025 138 Avenue SE
Renton, Washington 98055
February 16, 1981

Mr. Roger Mochnick M/S 443
Environmental Evaluation Branch
United States Environmental Protection Agency
Seattle, Washington 98101

I appreciate this opportunity to express concerns about limitations I find in the Draft Plan: Wastewater Management Study for the Lake Washington/Green River Basins.

Deficiencies exist in the following areas; (1) toxicant data and potential impacts (2) sludge content and sludge handling ramifications (3) relationship of the Renton facility to the Puget Sound plants (4) analysis of financial considerations and (5) the on-site recommendations.

Toxicants

Previous Metro documents emphasize the extreme importance of the toxicant study. Paraphrasing Mr. Neil Peterson's remarks made in August of 1978, "Metro must have the results of the toxicant study before recommendations on what configurations and treatment processes should be built in the next 10-25 years." NOAA and your agency similarly point to the unknowns relative to toxicants and their impact on the Sound. ①

We have no toxicant study yet we have a Renton facility plan - a plant expansion to cost millions of dollars - Can we safely dump wastewater from Renton into the Sound when we haven't the data base about toxicants? What treatment processes do we really need at Renton?

Sludge

Metro acknowledges that sludge is the most serious residual waste problem facing treatment facilities all over the country.
-Do we have the information necessary to a decision that places all sludge processing at Renton? What toxicants remain in the sludge? Can we safely contemplate land disposal? Are sludge contents appropriate to incineration? We are one year away from results of the sludge study. How can we ignore this lack of information when sludge handling will be one of the major system changes at Renton? ②

Relationship to the Puget Sound Plants

Metro is still waiting for a decision on secondary waiver. Metro consumers are still waiting for a decision on a Duwamish facility. As I understand the Preferred Puget Sound Facility Plan, the centerpiece of the plan was a Duwamish facility, with other system changes dependent on that facility. Here we are, charging ahead without a Duwamish facility but with all the problems that that plant was supposed to solve-CSO and toxicants, primarily. ③

I didn't find any analysis of how having or not having a Duwamish plant would affect the location of the outfall. Does the Alki outfall help or hinder the CSO and toxicant problem? Can future construction costs be mitigated more by an Alki or Point Pulley outfall?

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Conclusion

While the Renton decision is "late" in terms of capacity problems, it is too early in terms of having sufficient information to make the long-term decision which clearly serves the public interest.

It seems patently clear that the pressure is exerted by the land use entities--by allowing system hook-ups they have forced Metro's hand --- a hand that is half empty--no toxicant study, no sludge study, no Duwamish decision, no waiver decision and no power to deny service hook-ups to a system that is approaching overload and is threathening water quality. ④

Does EPA have the power to order hook-up denial when degradation of the river is at stake? DOE? Or does it fall to citizen action? ⑤

Financial Considerations

I find financial aspects of the study incomplete and inadequate to an understanding of what the costs are for implementation of this plan.

Questions relative to financing and rate impacts:

Re: incremental increase due to implementation of the Puget Sound Facility Plan. When would this increase take effect? How will this increase escalate over time. Is it correct that this is a separate set amount that will go into effect with or without the Renton facility? ⑥

For simplicity, I differentiate between what I call the current basic rate ($4.50) and the increase mentioned above.

How is the basic rate projected to increase over time? What are the components of the basic rate? What amount goes to capital costs? What amount to M & O? What portion to bond amortization?

Re: Bonds
What is the limit on Metro's bonded indebtedness? ⑦
Is there an interest rate limit at which Metro's bonds can be sold.
What bond costs are anticipated from this planned project? ⑧
When would bonds for this project be sold?

When would rate increase tied to this project go into effect? ⑥

Re: Policy Issue of "Who should pay?"

What array of funding possibilities were considered in addition to rate increases for current and future rate payers?

Was consideration given to a water pollution tax? As stated this plan is in direct reponse to capacity problems, which, if not solved will lead to degradation of the river. Thus, it appears we have a direct line cause and effect relationship attributable to specific sources. ⑨

Would a two tier rate structure meet the demands of equity?

What reduction in total costs would result from requiring an "up-front" fee on new connections?

On site Recommendations:

The section dealing with on-site system failure is totally inane. What it amounts to is synopsis of the ignorance level of the people they asked about septic tank systems. There is no hard data to substantiate their conclusion of massive septic tank failure.....I am not saying there is not septic tank failure, I am only saying the Metro data doesn't prove that there is a significant problem. ⑩

If such failure exists, isn't it Metro's obligation to recommend a comprehensive rehabilitation and conversion project to bring such systems into compliance or replace systems that will not work? Federal money is available, isn't it? There just has to be an aggragating entity. Certainly such a recommendation is more in keeping with a water quality concern than advocating another layer of government (management systems) to keep watch over septic systems constructed on soils inappropriate to the task. Please tell me how periodic inspection will cure a system installed on land that is unsuitable for a drainfield?

This management system recommendation is symtomatic of Metro's pervasive emphasis on drainfields as the accepted method of on-site disposal. If Metro believes the Soil Conservation Service figures that show 90% of the land in King County has severe limitations for septic tank drainfields and they are serious about an effective, long-term reliability quotient for on-site systems, then a responsibile recommendation has to be for some other form of on-site disposal.

With mounting evidence that the sufficiency of domestic water supply is already in question, isn't it a paradox that the water quality agency continues to stress water-based systems?....systems based on pollution of water of drinking quality....

Metro should be emphatically recommending the phase out of water-based systems unless they provide secondary treatment. Further, the on-site recommendations should advocate non-hydraulic systems or non-absorption systems, or systems dedicated to re-use of water.

Metro should stipulate that State and County mandatory hook-up requirements be abolished so that property owners with functioning conventional systems or innovative systems are not financially penalized.

I would be denying my true convictions if I failed to cite this plan as totally lacking a futuristic view. While this plan is the cheapest one they could fit into their pre-conceived notion, I feel strongly that future generations are not served by a centralized, hi tech, hi energy, hi chemical, hardware system which dumps into any body of water. We need adequate on-site systems or de-centralized plants with land disposal and re-use of nutrients and water. ⑪

Yours truly,

Mary Ellen Hamblin

Mary Ellen Hamblin

Response to Mary Ellen Hamblin Letter of February 16, 1981

1. Renton effluent is already entering Puget Sound via the Duwamish River and Elliott Bay. Toxicant information will be more important to questions of treatment or pretreatment than to questions of outfall location.

2. See General Response Number 5.

3. See Response Number 7 to PSCOG letter of February 5, 1981.

4. Although additional studies and decisions will be made in the future that relate in some way to the Renton plant, EPA believes the results of these studies and decisions will not affect the choice of an appropriate discharge location for Renton effluent or the decision to expand the Renton plant to 72 MGD capacity.

5. See Response Number 9 to Citizens Committee for Clean Water letter of February 15, 1981.

6. Figure 3-12 in Metro's Final Plan shows the annual rate increases necessary to support the Renton system recommended program and the Puget Sound plants "preferred facility plan". The exact amount of the rate increases will depend upon decisions made as the Puget Sound facility plans are finalized. In any case, Figure 3-12 estimates that rate increases for Puget Sound plant improvements will begin in 1982.

7. Metro's water quality capital program is financed by revenue bonds. There is no limit on the bonded indebtedness which may be incurred with revenue bonds so long as Metro maintains the revenue sufficient to pay the debt service on outstanding bonds.

8. There is no interest rate limit on Metro bonds. As to bond costs for the Metro recommended program, both the cost of issuance and the interest cost of the bonds required to finance the recommended program are built into the monthly sewer charge estimates in Figure 3-12 of Metro's Final Plan. Metro assumes that the capital program will be financed with 30-year revenue bonds at a 10 percent interest rate. Thus, financing the recommended program is analogous to purchasing a home with a long-term mortgage. Over 30 years at 10 percent interest, approximately $2.00 in interest will be paid for every $1.00 of principal.

9. See General Response Number 12.

10. EPA recognizes the importance of the recommendations for improving the performance of on-site systems in the non-sewer area. Not only will improved performance help protect surface water and groundwater, it will also help prevent unnecessary public expenditures for sewer systems. EPA is formally recommending that Metro take every available action to ensure that needed recommendations are implemented by appropriate authorities. Specific decisions on which recommendations will be most effective are the responsibility of the local implementing agencies.

11. Reuse concepts currently incorporated in the recommended facilities plan include recovery of methane gas from sewage sludge, and proposed land application and composting of digested sludge. Regarding decentralization, the final plan recommended program leaves open the option of building a Kenmore plant to treat flows from the north part of the study area. Six additional small decentralized plants using land application were evaluated in the draft plan and EIS, but the potential land use benefits of such plants did not appear to justify the increased costs involved, and little public support was expressed for this concept. Large-scale land application of Renton effluent appears to be infeasible because sufficient acreage of suitable close-in open space or agricultural land does not exist.

2651 S. W. 164th Place
Seattle, Washington 98166
February 16, 1981

RECEIVED
FEB 19 1981
ENVIRONMENTAL EVALUATION BRANCH

Environmental Protection Agency
Region X, 1200 Sixth Avenue
Seattle, Washington 98101

Attention: Roger Mochnick
M/S 443

Subject: Environmental Impact
Statement: Wastewater Management Plan for the Lake Washington/Green River Basins

Dear Mr. Mochnick:

This letter is in response to the subject Environmental Impact Statement Draft and the Municipality of Metropolitan Seattle Draft Plan. We live near Burien and will address herein problems we have encountered with respect to Metro's Alternative A-3.

A. Procedures followed by Metro leading to its recommendation of A-3, Point Pulley (hereinafter called Three Tree Point), do not appear to have followed the spirit or requirements of the law. The procedures in question are as follows:

1. Membership on the Renton 201 Citizens' Advisory Committee does not appear to have proper representation by citizens from the Southwest area. We believe that only one person from our area was on that committee and that person was not replaced when she felt she had to resign. Of 19 members, one or none is obviously inadequate for a greatly impacted area such as the Southwest.

Metro's own words in the Draft Plan, page 157, 2nd paragraph, state: "Committee membership was approved by EPA and consists of private citizens, public officials and individuals with environmental and economic interests who work or live in the study area." Was our Southwest area in the study area? Participation, however, is required by EPA regulations (pg. 157, Draft Plan). Apparently both Metro and EPA are responsible for the Southwest area's lack of proper representation. ①

2. Metro's Draft Plan reads on page 158, 2nd para. as follows: "...jointly sponsored a public meeting ....", and 3rd para., "Another public meeting was held...", and 4th para., ".... three public meetings were held in May, 1980 across the study area to discuss the Preliminary Plan with the public and to receive their comments and concerns." Where were these five meetings held? Was adequate notification of these meetings given to citizens in the Southwest area? Does publication of notice of meetings and summaries of proceedings in Metro's Clear Water Watch constitute proper public notification to citizens and groups in the Southwest area? The Three Tree Point locations at that time were being considered by Metro; therefore, it was not too early in the process.

Page 11, para. 1 of the Draft Plan Summary states: "Metro has held many public meetings and workshops ...". Besides the five mentioned above, what other gatherings did we miss?

3. The Draft Plan states that "... during the course of the wastewater study, numerous presentations have been made to various community groups, including Chambers of Commerce ......" What groups in our Southwest area were given a presentation? We know of none.

4. Does Metro's failure to adequately notify citizens of our area and provide for public comment and input into the planning process (as shown above) constitute a basis for invalidating the present Draft EIS and 201 Plan? (Ironically, many of those who would be sending their sewage out of their area to the Southwest area were given opportunities for input.) ①

5. We take issue with the composition of questions in the questionnaires distributed at the Preliminary Plan meetings (to which we Southwest citizens had no opportunity to respond). Questions 1 and 3 (pages 158 and 159 of the Draft Plan), which are very important questions, sound as if they are written so as to achieve a desired answer. Even if this was inadvertent, it is a serious matter. ②

6. The Draft Plan Summary, page 12, shows clearly that our Southwest area was left out of Metro planning for Public Information Meetings and Information Centers.

A meeting was scheduled for the Alki area but not for the Burien area. We have learned that the workshop meeting held at the Burien Library was scheduled after someone in our area heard about the plan and contacted Metro. Publicity for that meeting appeared to be mostly by word of mouth and on short notice as compared to notice given other area meetings. ①

It is astounding that cities such as Bellevue, Redmond and Renton would have information centers while the Southwest has not, when in fact this Southwest area may be more impacted than any of the three. Even after the workshop meeting was held at the Burien Library, that library did not have a copy of the full draft plan or the full EIS. We had to request that they try to get them. The Draft EIS, page 272, states that "the document has been forwarded to public libraries in the study area so that other concerned residents can review the potential impact of the project. Were we not to be considered as concerned residents?

If EPA were to reply that meeting notifications, libraries, etc., were provided for the study area only (which appears to be mainly the case), this would not satisfactorily answer our contention that the Southwest area has been left out of the planning process.

7. Please note EPA's statement on the last page of the Summary Draft EIS: "Opportunities for Public Involvement. "Metro's proposed Wastewater Management Plan will have important far-reaching effects on the future of the residents and the environment of the Lake Washington/Green River Basin study area."

What about "important and far-reaching effects on the future of residents and the environment" of the Southwest area, e. g. Burien, Three Tree Point, Seahurst, Seahurst Park, Normandy Park, Des Moines, Federal Way, other southwest communities, Vashon/Maury Island and the west shore of Colvos Passage? People in these communities may or may not live on the shoreline, but they do go to the beaches, swim in the Sound, go out in boats, fish, dig clams, gooey ducks, etc. They in effect have been denied the opportunities mentioned above.

8. The title of the Draft Plan: "Wastewater Management Study, Lake Washington/Green River Basins gives no clue to its connection with concerns about Puget Sound and is therefore misleading. If Southwest residents saw a meeting notice with that title it would have little meaning.

9. An article in the Seattle Times on December 22, 1980, page B5, cannot be cited by Metro as publicity on the Plan. Reference was made at the beginning of the article to Seacrest Park and Point Pulley. The only Seacrest we know of was a West Seattle marina on Elliott Bay. Point Pulley is not a name known or used in this area and is not even the legal name. The name was so little used that it was legally changed in 1980. In the same article information meetings are listed for Alki, Bellevue, downtown Seattle and Kent, but not for Burien. Repeated omissions such as this make it difficult to believe they were all inadvertent.

We have seen only one other article in the Seattle Times that related Metro's plans to our area. It described what occurred at the Public Hearing; this was obviously too late to be a notification of the hearing. The Highline Times carried a notice of the Public Hearings on page one; unfortunately this was on the same day as the hearing - hardly ample notice and in many cases useless for those who got this newspaper by mail the following day. Actually, the Highline Times is distributed to only a fraction of residents, so coverage in the Times and P. I. is important. The P. I. did publish an editorial recommending the Alki location.

10. Persons who attended the Highline Council/Metro meeting on February 2, 1981 have pointed out that Metro did not state that comments could be made to EPA by February 17. Unfortunately the Summary Draft EIS that was passed out by Metro did not have a corrected date for submitting comments. Metro should have been able to cross out the 2 and write in a 17 on each one. Since February 2 had already passed, people could not be expected to know that they could still comment to EPA. At least one person thought that comments made at the meeting would be sufficient. However, since EPA was not present at the meeting (we understand that Metro did not invite EPA until about 1½ days before the meeting) comments to EPA were not possible.

11. The Draft EIS contains a list of approximately 266 persons and organizations who received copies of the full Draft EIS. Of these only 3 people had addresses in the Burien area, one person in Federal Way, one sewer district near Burien, one newspaper in Des Moines, and two organizations were in Tacoma. Conspicuously not on the list are: The Burien Chamber of Commerce, Highline Community Council, The Highline Times, Seahurst Community Club, Three Tree Point Club, Highline Recreation Council, City of Normandy Park, Normandy Park Community Club, Hurstwood Community Club, City of Des Moines and many others to the south. How could these organizations have been left out when the list of 266 has many similar organizations all over the greater Seattle area? Also, the number of individuals in the Southwest who received the EIS is way out of proportion - that is, far less - than for Renton, Bellevue, etc. This constitutes a glaring omission. Who is responsible - EPA or Metro? ③

12. While we think we have some understanding of the involvement of the EPA as established by law and regulation, we wonder if the EIS draft was actually prepared by Metro. The impression is that the EPA and Metro are working closely together. Perhaps they are and feel that this is beneficial. However, we wonder how the EPA can then remain unbiased and detached enough to make decisions that are supposed (we believe) to promote environmental protection. What are the laws regarding this matter and are EPA and Metro following them carefully? (See attached page A-4 of the Highline Times.) ④

13. We question Metro's Community Relations Planner's statement that citizens in the Burien/Three Tree Point area were given adequate notice of the Draft Plan, etc. The statement that all voters who voted in our area in the November 1980 election were mailed a letter from Metro should be proven or retracted. No one we know, and we have asked many, received such a letter. Mrs. Matthews asked the planner early this month to please find out what happened but has received no answer. Also, the statement at the Burien workshop meeting that letters were send to Metro users in mail zones 98146 and 98166 was met with spontaneous laughter, since probably very few persons in this area, if any, are Metro users. (This point should be especially noted: citizens of this area are not Metro users.) ①

14. We recognize that an oversight or two understandably can occur. However, the numerous procedural omissions and errors mentioned above constitute a huge gap in the public involvement process. We do not think Metro can redress this wrong at this late date. Therefore EPA should reject Metro's choice of the tunnel and outfall to the Seahurst/Three Tree Point sites for this reason and for the other sound environmental reasons that are being submitted to EPA by the sewer districts, governmental entities, community groups and citizens. If EPA does not do this and Metro persists, then we request that a new 201 study of the South Sound area of impact including Vashon/Maury and Colvos Passage east shoreline, again because of the numerous procedural omissions and errors mentioned above.

B. Following are our comments with respect to the Three Tree Point sites:

1. We favor tertiary treatment with all its attendant benefits. We know Metro has considered this and rejected it for an apparent quick fix that could have disastrous consequences in the future. ⑤

2. Although tertiary treatment is an attainable goal in this age of modern technology, if Metro cannot see itself able to accomplish this, we feel that a pipe from the mouth of the Duwamish River into Elliott Bay should be a subject of further study. In fact a pipe all the way from Renton would avoid a lot of problems. Alternative B-1 makes sense when one contemplates the really unpalatable idea of bringing sewage all the way to Renton from as far away as Snohomish County. It is only logical that a plant be built to serve northeast King County. ⑥

3. Is EPA aware that the Lakehaven Sewer District is not in compliance with the NPDES permit? This should be one of the factors looked at when considering the Three Tree Point area outfall. ⑦

4. We call your attention to "Information Paper, Toxicants," undated, apparently printed by Metro, Table 2, a copy of which is attached: "Priority Pollutant Analyses, May 17-19, 1978, Metro Treatment Plant Wastewaters." Please note that Renton effluent column R shows five Volatile Organics indicating a.h.e. (avoid human exposure). Also again see column R where at least three Volatile Organics apparently exceeded standards. Presumably Metro can provide the complete paper. Are these concentrations in Renton effluent still about the same? ⑧

5. The EIS Draft is deficient because it does not address the effect of the combined effluent from the sewer districts in the Southwest area of an expected 200 million gallons per day and Metro's effluent of 100 million gallons per day. This concentration of 300 million gallons per day would be going through Colvos Passage where the volume of water narrows to about one-third of the volume of water between Vashon Island and Three Tree Point. What is the depth of the most shallow point where the effluent would flow in that passage and what would be the effect at that point? Independent studies should be made of the impact in Colvos Passage before any Three Tree Point decision is made.

6. Metro's large drawings of cubes being shown to the public and to its Water Quality Committee (and soon to be shown to the Metro Council) show only the ratio of the volume of Renton Plant's effluent(as it comes out of the pipe into Puget Sound water) to the volume of water adjacent to the outfall. However, Metro does not acknowledge by a similar large drawing how the cubes are changed after the effluent enters Colvos Passage. The missing drawing would show a cube about three times as large for sewage volume and a cube about one-fourth as large for the adjacent water. And how would these cubes compare if you take into account the fact that one fourth (25%) of the water in Colvos Passage heading north actually goes around North Vashon and heads south again!!? If Metro insists on continuing to show the first drawing, it should be required, to be fair, to show a second drawing of the same type representing the water volumes in Colvos Passage (and well into it). (Alyn Duxbury has shown with the Puget Sound Hydraulic Models that 25% of the water in Colvos goes around again. Consequences of this factor must be considered; the cumulative effect could be alarming.) ⑨

7. Alyn Duxbury of the University of Washington is Assistant Director for New Programs for the Washington Sea Grant Program. The Highline Times (see attached) quotes him as saying he thinks South Sound discharge "is one of the least preferable options. "If you want to put something in Puget Sound, like sewage, and you want to utilize nature, you want to put it in a place where it gets the widest possible dispersion. "If you want to do best by nature, put it where it disperses faster." In view of Duxbury's position and qualifications, these statements of his should carry considerable weight in EPA's deliberations. ⑩

8. Metro is looking primarily at costs. We hope that the EPA fully realizes its responsibility to protect the environment. Possible future environmental costs should not be inflicted on all the people, wherever they live, who regard Puget Sound as a unique national treasure to be protected from unnecessary exposure to pollutants whose true effect over time is unknown. (Metro admits that it is exceeding its limits in the Duwamish right now; this could happen to Puget Sound.) ⑪

It should not be required of citizens like us who are not even Metro users to have to prove to Mr. Lampe that spending an extra estimated one hundred million dollars (inflated figure) is worth not choosing the Three Tree Point locations. Metro's answers to citizens attempts to do this go along the lines of "We don't see any problem with that," and "No, that is not a factor," and on and on. Metro has placed some of their effluent in the sound and then has said: "We couldn't find it." We think when 100 to 300 million gallons a day are pouring into the south sound, depending on where you are looking, that it will be fairly easy for Metro to find it, especially in Colvos Passage, but probably also right off Three Tree Point when the current is slow.

Metro seems to be afraid of adding even a few dollars a month for a valuable service. (City Light has no qualms.) As a result, Metro is lendng weight to the old addage of penny-wise and pound-foolish. Those who have contributed to the need for added sewer facilities should be expected to pay for that service. To accommodate them at the expense (environmental) of many others by looking for the cheapest way is unfair.

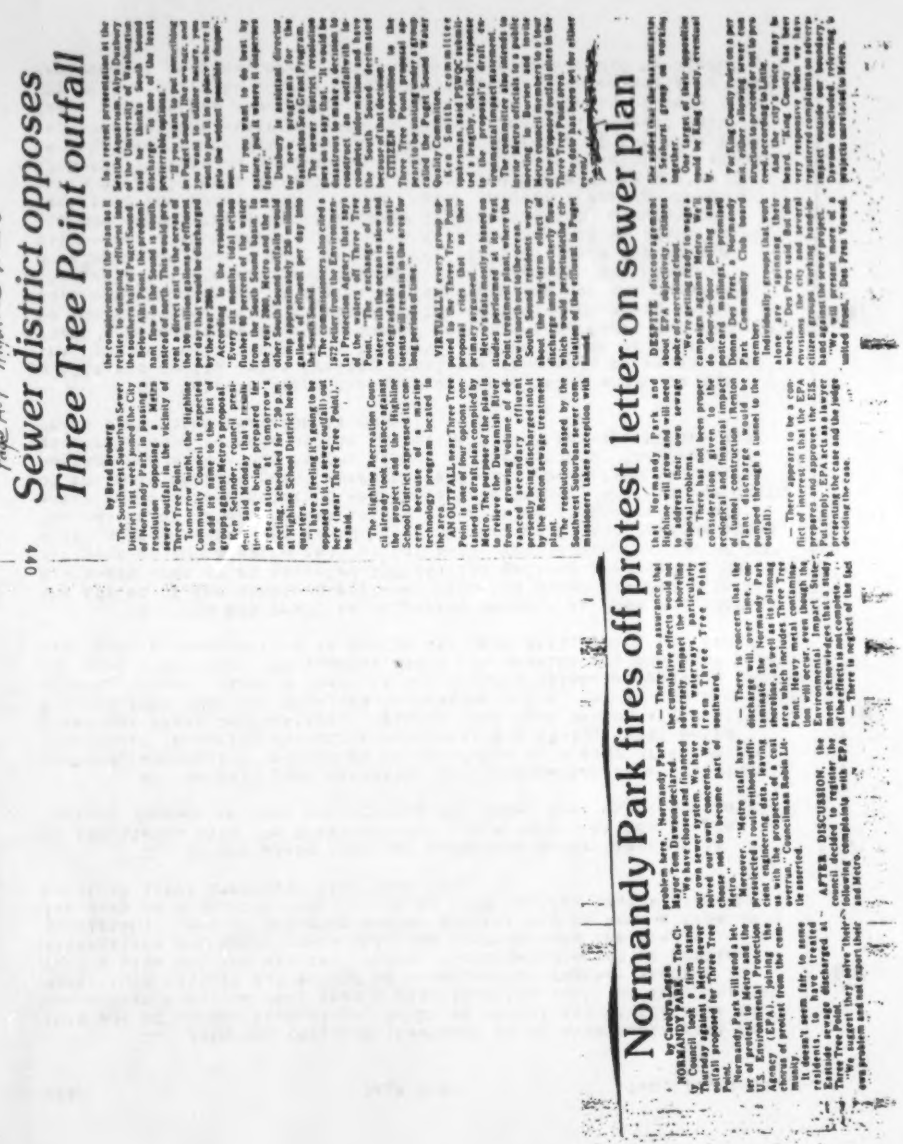
C. This letter has shown that the Southwest area has been neglected in the planning process and that Metro has not provided adequate information on impacts to be expected on sewer districts, people, communities, water quality, sea life, etc. If Metro is allowed to prevail in this matter, EPA will not have followed its mandate for fairness and environmental responsibility.

Sincerely,

Mr. and Mrs. Pierre Matthews

Enclosures
Page A-4, Highline Times
Table 2, Priority Pollutant Analyses

Encl.



Page A-4 Highline Times

Sewer district opposes Three Tree Point outfall

by Brad Broberg

The Southwest Suburban Sewer District last week joined the City of Normandy Park in passing a resolution opposing a Metro sewer outfall in the vicinity of Three Tree Point.

Tomorrow night, the Highline Community Council is expected to add its name to the list of groups against Metro's proposal.

Ken Selander, council president, said Monday that a resolution was being prepared for presentation at tomorrow's meeting, scheduled for 7:30 p.m. at Highline School District headquarters.

"I have a feeling it's going to be opposed to it (a sewer outfall) out here (near Three Tree Point)," he said.

The Highline Recreation Council already took a stance against the project and the Highline School District expressed its concern because of a marine technology program located in the area.

AN OUTFALL near Three Tree Point is one of four options contained in a draft plan compiled by Metro. The purpose of the plan is to relieve the Duwamish River from a growing volume of advanced secondary effluent presently being discharged into it by the Renton sewage treatment plant.

The resolution passed by the Southwest Suburban sewer commissioners takes exception with the completeness of the plan as it relates to dumping effluent into the southern half of Puget Sound.

Below Alki Point, the predominant flow in the Sound is south, instead of north. This would prevent a direct exit to the ocean of the 100 million gallons of effluent per day that would be discharged by the year 2000.

According to the resolution, "Every six months, tidal action flushes 80 percent of the water from the South Sound basin. In the year 2000, Metro and the 18 other South Sound outfalls would dump approximately 230 million gallons of effluent per day into the South Sound."

The commissioners also cited a 1972 letter from the Environmental Protection Agency that says of the waters off Three Tree Point, "The exchange of the waters with the ocean is slow and nondegradable waste constituents will remain in the area for long periods of time."

VIRTUALLY every group opposed to the Three Tree Point proposal cites that as their primary argument.

Metro's data mostly is based on studies performed at its West Point treatment plant, where the flow is north out to the ocean.

South Sound residents worry about the long-term effect of discharge into a southerly flow, which would perpetuate the circulation of the effluent in Puget Sound.

In a recent presentation at the Seattle Aquarium, Alyn Duxbury of the University of Washington said he thinks South Sound discharge "is one of the least preferrable options."

"If you want to put something in Puget Sound, like sewage, and you want to utilize nature, you want to put it in a place where it gets the widest possible dispersion.

"If you want to do best by nature, put it where it disperses faster."

Duxbury is assistant director for new programs for the Washington Sea Grant Program.

The sewer district resolution goes on to say that, "It would be disastrous to make a decision to construct an outfallwith incomplete information and have the South Sound decimated because of that decision."

CITIZEN opposition to the Three Tree Point proposal appears to be uniting under a group called the Puget Sound Water Quality Committee.

Ken Smith, committee spokesman, said PSWQC submitted a lengthy, detailed response to the proposal's draft environmental impact statement.

The committee also intends to invite Metro officials to a public meeting in Burien and invite Metro council members to a tour of the proposed outfall sites in the Three Tree Point area.

No date has been set for either event.

Normandy Park fires off protest letter on sewer plan

by Carolyn Logan

NORMANDY PARK — The City Council took a firm stand Thursday against a Metro sewer outfall proposed for Three Tree Point.

Normandy Park will send a letter of protest to Metro and the U.S. Environmental Protection Agency (EPA), joining the chorus of protest from the community.

It doesn't seem fair, to some residents, to have treated Eastside sewage discharged at Three Tree Point.

"We suggest they solve their own problem and not export their problem here," Normandy Park Mayor Tom Dawson declared.

"We have chosen and financed our own sewer system. We have solved our own concerns. We choose not to become part of Metro."

Moreover, "Metro staff have preselected a route without sufficient engineering data, leaving us with the prospects of a cost overrun," Councilman Robin Little asserted.

AFTER DISCUSSION, the council decided to register the following complaints with EPA and Metro.

— There is no assurance that the cumulative effects would not adversely impact the shoreline and waterways, particularly from Three Tree Point southward.

— There is concern that the discharge will, over time, contaminate the Normandy Park shoreline, as well as its planning area which includes Three Tree Point. Heavy metal contamination will occur, even though the Environmental Impact Statement acknowledges that a study of the effects is not complete.

— There is neglect of the fact that Normandy Park and Highline will grow and will need to address their own sewage disposal problems.

— There has not been proper consideration given to the ecological and financial impact of tunnel construction (Renton Plant discharge would be pumped through a tunnel to the outfall).

— There appears to be a conflict of interest in that the EPA prepares and approves the EIS. Put simply, EPA acts as a lawyer presenting the case and the judge deciding the case.

DESPITE discouragement about EPA objectivity, citizens spoke of exercising clout.

"We're getting ready to wage a campaign against Metro. We'll do door-to-door polling and postcard mailings," promised Donna Des Pres, a Normandy Park Community Club board member.

Individually, groups that work alone are "spinning their wheels," Des Pres said. But she envisions the city and several citizen groups working hand-in-hand against the sewer project.

"We will present more of a united front," Des Pres vowed.

She added that she has contacted a Seahurst group on working together.

One target of their opposition would be King County, eventually.

For King County rules on a permit, either allowing sewer construction to proceed or not to proceed, according to Little.

And the city's voice may be heard. "King County has been very responsive when we have registered complaints on adverse impact outside our boundary," Dawson concluded, referring to projects unrelated to Metro.

Encl.

Table 2. Priority Pollutant Analyses,
May 17-19, 1978,
Metro Treatment Plant Wastewaters

Compound	Concentration, µg/l[a]					Tentative standards, µg/l
	WPi	WP1	WP2	R	RB	
Volatile Organics						
Methyl chloride	---	---	---	1	---	a.h.e.[b]
Methylene chloride	50	18	30	27	24	a.h.e.
Chloroform	23	19	16	11	4	
1,1-dichloroethane	---	---	1	Tr[a]	Tr[a]	2 mg/l
1,1,1-trichloroethane	2	3	3	1	9	30
1,1-dichloroethylene	22	13	40	16	17	a.h.e.
1,2-trans-dichloroethylene	2	18	4	2	[illegible]	a.h.e.
Trichloroethylene	50	22	30	25	4	4.6
Tetrachloroethylene	60	16	40	37	7	500
1,1-dichloropropane	1	---	---	---	---	a.h.e. (14)[c]
Aromatics and Halcaromatics						
Benzene	5	45	10	7	0.4	100
Toluene	250	20	120	45	5	25
Ethylbenzene	17	<1	40	16	<1	a.h.e. (25)[c]
1,2-dichlorobenzene	---	---	---	1	---	0.05
1,4-dichlorobenzene	---	6	---	1	---	1.0
Polynuclear Aromatic Hydrocarbons (PAH)						
Naphthalene	14	36	18	---	7	---
Base and Neutral Semi-Volatile Compounds						
Isophorone	15	---	---	---	---	1.4
Diethyl phthalate	Tr[a]	Tr[a]	Tr[a]	Tr[a]	Tr[a]	
Di-n-butyl phthalate	---	5	4	---	1	0.3 total
Butyl benzyl phthalate	18	15	---	---	8	
Phenolics						
Phenol	9	15	7	<1	23	0.05
2,4-dimethylphenol	1	---	2	---	---	a.h.e. (28)[c]
Pentachlorophenol	3	6	2	19	<1	0.5

[a] Detection limit = 1 ppb, Tr = 0.1 ppb

[b] "a.h.e." = Avoid human exposure

[c] Tentative standards in parentheses are limits for aquatic protection

Source:
WPi = West Point influent, May 18 and 19
WP1 = West Point effluent, May 18 and 19
WP2 = West Point effluent, May 17 and 18
R = Renton effluent, May 18 and 19
RB = Richmond Beach effluent, May 18 and 19

Response to Pierre and Vivian Mathews Letter of February 16, 1981

1. See General Response Number 14.

2. The questions were not designed to be leading. The questions were designed to elicit public comment on the preliminary plan. Several of the questions were in the form of a statement followed by a request for agreement or disagreement. In all cases, room for additional comment was provided. These questions were not intended nor were they used to rate public opinion in a statistical manner. Rather, they were used to determine which issues were of concern to the public and to identify any new issues which had not been previously considered.

3. The "distribution list" printed in the Draft EIS was not the actual mailing list for the document. It was based on an erroneous Metro computer printout, which was not discovered until after printing. Summaries of the EIS were mailed with summaries of the draft plan to persons on Metro mailing lists residing near the East Passage area. EISs and summaries were also available at public meetings held in West Seattle, Burien, Highline, and Vashon Island.

4. See General Response Number 13.

5. Advanced wastewater treatment (AWT) is seldom used for ocean discharge of municipal wastewater because secondary treatment removes a significant portion of the pollutant load. The Final EIS predicts no major water quality problems would occur with a secondary effluent discharge off Seahurst Park, and given this finding, there is little rationale for installing AWT with an ocean discharge. With a continued Green/Duwamish River discharge, nitrification of effluent (a type of AWT) was evaluated in facilities planning, and it was concluded that nitrification would create reliability problems and would still not eliminate risks to the river's fishery. The effluent might be made still less threatening to aquatic life through implementation of additional AWT processes, but the costs and energy requirements of such alternatives would increase substantially.

6. An Elliott Bay discharge was considered and found not to be acceptable from a water quality standpoint. Alternative B-1 involves continued discharge to the Duwamish River, which is not favored by water quality and fisheries agencies. The present plan does not foreclose the option of constructing a Kenmore plant in the future.

7. There is no apparent relationship between the Lakehaven Sewer District's effluent quality and the decision to discharge off Seahurst Park.

8. The values in Table 2 for the Renton plant discharge were based on the analysis of only one 24-hour sample. An extensive toxicant study now underway at Metro is expected to yield more detailed and reliable estimates of the sources, concentrations, and fate of priority pollutants present in the Renton treatment plant influence and effluent.

9. This deficiency was addressed in the Final EIS (Chapter 6). Metro has indicated the total dilution of all effluent would be about 1,500:1, a level which will not affect beneficial uses in Colvos Passage. The depth of the most shallow area across Colvos Passage is about 200 feet, near the south entrance. See General Response Number 2.

10. Alki Point does appear to be a better location in terms of rapid effluent dispersal.

11. EPA regulations for facilities planning require that the most cost-effective alternative be selected. This incorporates considerations of the benefits to be achieved with each alternative. Future environmental costs would be incurred with each of the alternatives, including the no-project alternative, so the question is really one of balancing the costs, environmental improvements, and adverse environmental impacts of each alternative.

September 16, 1981

RECEIVED
FEB 20 1981
ENVIRONMENTAL EVALUATION
BRANCH

Mr.Roger Mochnick
Environmental Evaluation Branch M/S 443
Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: Expansion of Renton Treatment Plant (Metro)

Dear Mr. Mochnick:

Be advised that we feel there are too many unanswered questions concerning the proposed expansion of the Renton treatment facility of Metro. I believe the expansion should be held up until those answers are obtained.

I understand one of the problems that is being studied is sludge in the system. Why not wait for the expansion to determine the possible solutions to such sludge. ①

We worry also about toxicants getting into Puget Sound. Has that problem been solved? Isn't there a way of handling the problem without dumping into the Sound? What about inland counties or States that have no body of water into which they can dump sewage/waste albeit treated waste? Why can't you or Metro propose a dumping ground other than our beautiful Puget Sound? ②

Also, what about the costs of expansion? How will they be handled? Will current ratepayers have to start paying now for expansion of facilities when the present facilities can handle the waste of such current ratepayers? What is the forecast of costs for this giant monstrosity on a per ratepayer basis in, say, 1990? ③

Why do the "authorities" proposing this project suggest only ONE plant? Shouldn't there be smaller treatment plants in other areas? I understand that, at present, waste is piped all the way from Bellevue and beyond in order to get to the plant west of Renton. It would seem to me that, if the "authorities" were interested in the human population, they would propose dispersal of the treatment centers in order to avoid something happening to a single facility in one place. What would happen if, say, there was a large earthquake that disrupted the treatment plant and/or some of the major lines near Renton's low-lying valley? It seems to me that the health hazard would be too much to imagine. ④

I would also like to point out that current ratepayers must be given some exemption for any expansion costs. We don't benefit from such expansion--only future developments do. (Municipalities can exempt residents/taxpayers from certain assessments when residents/taxpayers receive no benefits or have other beneficial interest.) ⑤

Sincerely,
Warren Vaupel
Versie and Warren Vaupel

400 Cedar Avenue S.
Renton, WA 98055

Response to Versie and Warren Vaupel Letter of September 16, 1980

1. See General Response Number 5.

2. There is no feasible alternative to Renton effluent reaching Puget Sound (whether the disposal be direct off Seahurst Park or Alki Point, or indirect, via the Duwamish River). Other inland areas generally dispose of treated sewage to lakes, rivers, or to the groundwater. Many of these receiving waters are used for drinking water supply or other beneficial uses. It is preferable to dispose wastewater to saltwater because of its greater ability to disperse effluent. Toxicant problems related to Metro's waste discharge are being studied in Metro's ongoing toxicant study.

3. See General Response Numbers 10 and 12.

4. At this time, Metro considers the advantages of a centralized system to outweigh the disadvantages mentioned. However, the option remains to construct a Kenmore facility at a future time.

5. See General Response Number 12.

LESLIE P. SUSSMAN
1 North Stadium Way, #6
Tacoma, Washington 98403
February 18, 1981

Mr. Craig Partridge
EPA-1200-6th Avenue
MS 443
Seattle, Washington 98101

Dear Mr. Partridge:

This letter is to protest against the alternative plan A3 which involves the dumping of affluent in the three point area.

We are concerned that this will contaminate the sound area especially the Gold Beach Vashon Island. We trust that you will not proceed with these programs and plans. ①

Sincerely,

Leslie P. Sussman

LPS:lm

RECEIVED
FEB 19 1981
ENVIRONMENTAL EVALUATION BRANCH

Response to Leslie P. Sussman Letter of February 18, 1981

1. See General Response Number 1.

MR: ROGER MOCHNICK M/S 443
EPA REGION 10
1200 6th AVE
SEATTLE, WA
98101

HORACE
PARKER
15004 24th SW
SEATTLE.

RECEIVED
FEB 18 1981
ENVIRONMENTAL EVALUATION
BRANCH

DEAR MR MOCHNICK:

I WOULD LIKE TO CLEARLY COMMUNICATE TO YOU OUR STRONG OBJECTION TO YOUR PROPOSED PLAN TO PIPE SEWAGE FROM RENTON TO THE SEAHURST/PT. PULLEY AREA OF SOUTH PUGET SOUND.

REGARDLESS OF YOUR NUMEROUS SCIENTIFIC AND TECHNICAL STUDIES WHICH FORCAST NO SIGNIFICANT ADVERSE IMPACT ON OUR BEACHES AND WATER, COMMON SENSE, INTUITION AND YEARS OF EXPERIENCE LIVING AND PLAYING IN THIS AREA TELLS US DIFFERENT.

OUR INTUITION TELLS US THAT PUMPING APPROX 100 MILLION GALLONS OF EFFLUENT/day INTO AN AREA OF RELATIVELY LOW CURRENT, TIDE AND EDDIE (SP) ACTIVITY SIGNIFICANTLY INCREASES THE PROBABILITY OF EVENTUAL FOULED BEACH WATER AND CONTAMINATED SHELLFISH. AT BEST, THIS OPTION IS A CALCULATED RISK WHERE THE STAKES ARE VERY HIGH. ①

THERE ARE ALTERNATIVES OTHER THAN SEAHURST THAT MAKE A LOT MORE SENSE FROM AN ENVIRONMENTAL AND ECONOMIC PERSPECTIVE.

② 1.) APPLY THE MONEY TOWARDS REVAMPING THE RENTON SITE.

③ 2) PIPE THE SEWAGE TO ALKI WHERE IT IS CERTAIN THAT ACTIVE CURRENTS AND TIDES WILL DILUTE THE EFFLUENT. ALTHOUGH THE DIRECT COST OF THIS ALTERNATIVE IS HIGHER, THE LONG TERM ENVIRONMENTAL COSTS WILL CERTAINLY BE LOWER.

COLLECTIVELY, WE AS CITIZENS OF SEAHURST ARE FIRMLY UNITED AND ORGANIZED AGAINST THIS PROPOSAL. WE ARE PREPARED TO EXHAUST EVERY AVAILABLE POLITICAL AND LEGAL AVENUE TO HALT THIS DEVELOPMENT.

LONG AFTER THE PLANNERS AND RESEARCHERS HAVE MOVED ON, WE STILL HAVE TO LIVE WITH THE BEACHES AND WATER IN OUR COMMUNITY. PLEASE GIVE US THE SAME CONSIDERATION THAT YOU WOULD IF YOU LIVED HERE YOURSELF.

THANK YOU, Horace Parker

Response to Horace Parker Letter of February 18, 1981

1. See General Response Number 1.

2. Various alternatives for upgrading treatment at the Renton plant and continuing discharge to the Green/Duwamish River were evaluated as part of the planning and environmental assessment process. The final plan recommended program was determined to be superior to these alternatives from both cost-effectiveness and environmental impact standpoints.

3. There is presently no indication that long-term environmental costs would in fact be lower at Alki Point.

RECEIVED
FEB 18 1981
ENVIRONMENTAL EVALUATION BRANCH

February 16, 1981

Metro Sewer District
821 Second Avenue
Seattle, Washington 98104

Attn: Geraldine Larrance
Community Involvement Specialist

Re: Wastewater Management Study for Lake Washington/
Green River Basins also known as Renton 201 Study

Gentlemen:

Your above Plan is incomprehensible to a citizen who has always felt government agencies should be held accountable for their actions and that the populace in the areas affected by such plans must be properly notified and informed of proposed governmental decisions. We in the southern Sound communities were not.

Below are some questions I feel need answered.

1. Why have you discounted the Elliott Bay location for the Renton sewage outfall location? There is already a pipeline right-of-way from the Renton treatment plant to Elliott Bay, correct? It must be cheaper to put a larger pipe where the existing pipeline right-of-way is and extend it out into the Sound beyond the Bay versus tunneling down 750 feet and across to Three Tree Point purchasing all the right-of-ways in its path. ①

2. Why are you continuing to state that there is no effect one mile from any of Metro's outfall locations when last week's P.I. brought out that the coliform levels along the beaches within the one-mile range of the Metro outfalls are much higher than adjacent beaches? ②

3. Isn't it true that if you go ahead with your Three Tree Point sewage outfall location the Metro customers will face a three-fold rate increase? ③

4. Why would you deliberately misstate the capacity of the future outfall pipeline as 140 million gallons a day when it is actually planned to have a 340 million gallons-a-day capacity? ④

---

5. How can an agency lawfully choose to dump effluent from a huge metropolitan area into an area that has its own separate sewer districts and is not covered by Metro's services? ⑤

6. What right does Metro have to discharge in an area of the Sound which is known to have a sluggish water exchange rate and has recently learned more of another pollution problem in Commencement Bay? There are other metropolitan areas in the southern Sound who haven't an alternative but Metro has many more logical alternatives in areas where the effluent will have a quicker path to the open ocean. ⑥

7. Will the enclosed petitions with 700+signatures showing the objections of Vashon and Maury Islanders to the Three Tree Point outfall area have any bearing on the final outfall location decision? ⑦

8. Does Metro serve the people or only itself?

(Mrs.) Jeanne L. Snell
Gold Beach, Maury Island
Rt. 1 Box 210
Burton, Washington 98013
(1) 463-3853

cc. E.P.A. Attn: Craig Partridge
1200 Sixth Avenue M/S 443
Seattle, Washington 98101
Editor, Vashon Maury Island BEACHCOMBER
Editor, HIGHLINE TIMES
Editor, TACOMA NEWS TRIBUNE
Editor, PENINSULA GATEWAY, Gig Harbor
Editor, SEATTLE P.I.
Editor, SEATTLE TIMES

Response to Jeanne L. Snell Letter of February 16, 1981

1. Capital cost for the Seahurst tunnel is 102.2 million. Capital cost for the West Duwamish gravity sewer is 139.8 million. In addition, Elliott Bay is not considered a desirable location for an outfall.

2. See General Response Number 1.

3. See General Response Number 10.

4. The ultimate capacity of the Renton treatment plant is 144 MGD. The capacity of the tunnel is designed for a maximum of 144 MGD of effluent plus peak storm flow up to 325 MGD. Since increases in average effluent flow above 144 MGD would take up tunnel capacity needed for peak flows, effluent flows beyond 144 MGD are not planned for the tunnel. If future service area growth results in waste loads exceeding 144 MGD, planning and decisions would be required for new treatment facilities and new disposal alternatives.

5. See Response Number 1 to City of Normandy Park letter.

6. See General Response Number 1.

7. EPA is required to carefully consider citizen comments in all decisions having significant environmental impact. EPA is required to weigh public comments along with the requirements of law, and with factual information bearing on a decision. Different segments of the public often express different preferences. Although citizen comments are not the only consideration in EPA decisions, we hope we do reach better decisions by considering public concerns.

February 17, 1981

E. I. A.
1200 Sixth Avenue, M/S 443
Seattle, Wn. 98101

Attn: Craig Partridge

Re: Metro's Wastewater Management Study for Lake Washington/
Green River Basins also known as Renton 201 Study

Gentlemen:

Enclosed are additional petitions from Vashon and Maury Island Residents registering their opposition to the A-3 alternative to the above study. There are approximately 70 signatures on today's petitions and added to the 700+ submitted to Geri Larrance of Metro totals 800 or more.

I would like to thank Mr. Craig Partridge for his attendance and participation at Vashon-Maury Island's Community Council meeting last night and express my regrets that there wasn't more time available for your presentation and our comments.

As I tried to state last night, the islands were not properly notified in a timely fashon. I as an individual did all of the informing that was done. Yes, the plans were sent to the Beachcomber and the Community Council but they were sent out during the Christmas season with no indication that the plan involved our area and most of the people either threw them away immediately or put them in their already busy "info" stack. My information regarding the plan was supplied by a friend in the Three Tree Point area who was informed in an interview by a reporter of the Highline Times. ①

I and many more here feel that the Plan was meant to be slipped by the uninformed public and quietly brought to fruition before any objections could be raised. The reason for these feelings is that everyone I have contacted in the Southern Sound Communities including all of the major newspapers have not known about the consequences of or even of the study.

I have not taken on this cause lightly. I have attended meetings, done lots of reading of the full plan and EIS, talked to PCA as well as various oceanographers and attended Alyn Duxbury's seminar on People-waste and Puget Sound held at the Seattle Acquariam. I have learned more about wastes and its treatment than I ever wanted to know, but I have also confirmed my earlier feelings and suspicions that the Southern Sound is no place to dump any large amount of effluent that could be planned in another area. The other areas being in tidal flow areas that afford it a much quicker path out of the Sound. ②

RECEIVED
FEB 20 1981
ENVIRONMENTAL EVALUATION BRANCH

It is my feeling after hearing Metro's presentation last night and at an earlier Metro information meeting at Highline Community Council's meeting that the people really have very little influence on the deicison making processes of Metro or perhaps even the E.P.A. I hope that you will prove me wrong and that our say and the future of the Sound will be respected and considered in an overall view of the good of the Sound, our most coveted resource in the Pacific Northwest. Once we have the pollutants in the Sound, it will be much more costly if possible to ever remove them and once the tunnel is built it will be there forever pouring more and more into our precious waters.

Your E.I.S. on this plan has too many "perhaps" and "we thinks". It also states that energy efficiency is expected to be a critical design criterion and the Alternative D-1 has the lowest energy requirement. It is also stated that the preferred A-3 plan is the least flexible of any of the long term alternatives and that the Kenmore treatment plant is the more flexible plan and more capable of responding to changes in population projections or land use plans in the Northern part of the Study area and that it is less likely to be growth inducing or growth inhibiting. What has happened to the Kenmore Plan? It wasn't even presented at the meeting last night. ③

I sincerely hope that the petitions and the signatures thereon will be considered for something other than scratch paper.

Sincerely

Jeanne Snell

Mrs. Jeanne L. Snell
Rt. 1 Box 210
Burton, Washington 98013
(1) 463-3853

Encls.

Example

To: METRO SEWER DISTRICT
821- 2nd Avenue
Seattle, Washington 98104

ATTN: Geraldine Larrance
Community Involvement Specialist

IN RE: Wastewater Management Study for Lake Washington/
Green River Basins also known as Renton 201 Study

We, the undersigned residents of Vashon and Maury Islands, hereby oppose the A-3 alternative to the above study due to the proposal that the effluent be introduced to the Sound at or near Pt. Pulley, commonly known as Three Tree Point. We feel that it will have a detrimental effect on a greater area of the Sound than the other more northern alternatives due to the division of tidal flow in the Pt. Pulley area. This tidal flow could mean that the effluent would travel as far as The Narrows and up Colvos Passage before moving to the open ocean. We wish our signatures to become part of the public record in opposition to Alternative A-3.

Date	Name (Printed and signed)	Address
	Barbara Goering Barbara Goering	P.O. #56 Burton Wa 98013
	Charles F.	P.O. Box 762 Vashon 98070

(NOTE: Approximately 700 signatures were received by EPA
on this petition.)

Response to Jeanne L. Snell Letter and Petition of February 17, 1981

1. See General Response Number 14.

2. See General Response Number 1.

3. The EIS attempts to describe the environmental impacts of the alternatives as definitively as possible, but certain findings are qualified where they are tentative or uncertain. EPA does not claim that perfect knowledge exists regarding impacts of the alternatives, but believes sufficient knowledge does exist to allow an informed decision. Regarding the Kenmore plant, the final plan recommended program leaves open the option of building a Kenmore plant in the future, since it defers the decision regarding where to treat flows from the north part of the study area.

2745 SW 156th Street
Seattle, Washington 98166
February 17,1981

RECEIVED
FEB 20 1981

U.S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

ATTN: Mr. Roger K. Mochnick M/S 433

REF: EIS & 201 Draft Study for Wastewater Management of Lake Washington/Green River Basins--Seattle Metro's Renton Study Area

Dear Mr. Mochnick:

I am concerned with the logic of what appears to be a choice of the most practical solution to Metro's Renton effluent problem. In reviewing the Draft 201 proposals--the choices seem to be Alternative A-3 with an outfall at Point Pulley(Route C) or Seahurst Park(Route A) due primarily to cost effectiveness. Either of these are matched against an Alki Point outfall--Alternative A-5--admittedly a longer pipeline.

Going back to the inception of the Renton disposal facility, was there no concern by residents of South Park, Allentown, or others at that time about potential contamination to the Duwamish River? Was there merely no concern about ecology or were the parameters and data juggled to make it plausible? Or was the political clout lacking to do otherwise? Perhaps the same problems exist today with respect to the proposed new Renton sewage plant effluent outfall. I would guess that the effluent discharge into the Duwamish River was utilized at that time based upon a least cost solution. It is now apparent that least cost is NOT always best in making determinations. Yet the same logic is being applied currently in discussing A-3 Versus A-5. The same rhetoric no doubt existed over 20 years ago and in turn set us up for the current malaise--contributing to the pollution of the Duwamish River. ①

To suggest that none of the solutions smack of political overtones would be facetious if not dishonest. This was brought into the open by a King County councilman who stated that strictly between the A-3 and A-5 alternatives, regardless of any other considerations, a higher number of council votes from the A-5 affected area could eliminate that proposal in favor of A-3. Right or wrong for any number of reasons, many small communities NOT even in the Metro Sewer Service Area(some NOT EVEN AWARE of the plans)are being set up to absorb the impact of sewage discharge of a 650 square mile package because it is politically safe and economically justifiable to those within the Service Area? Costs can be juggled on paper and ecological parameters can be made to fit as necessary.

For instance, regarding ecological impact, in the entire EIS Draft only a few paragraphs(ref pg 123, EIS Draft)touch on the effects of the East Passage's SLOW and, in some areas, unpredictable flow. Not to mention the impact of a 400%(or more)increase to the 30 Million Gallons/Day discharge of the 7 existing outfalls in the East Passage exclusive of Tacoma/Commensement Bay. No impact from an additional 144 MGD? Out of sight--out of mind??? ②

Yet there was mention of some concern for another outfall at Alki Point because 8MGD of primary effluent is discharged there now. Only 8MGD vs. 80 MGD which is also only primary treated. Why so much concern about only 8 MGD when Metro itself CONFIRMS throughout the 201 Draft numerous times(specifically, pg. 44 para3 & pg. 48 last para referencing Alternative A-5)that " Alki Pt. is a preferable site over Pt. Pulley" and "Alki Pt. area is a more suitable location for effluent disposal than Pt. Pulley due MAINLY to the net northward currents off Alki". ③

Paragraph 3, pg 39, 201 Draft--"A particle discharged in the area(Pt. Pulley) would probably flow south and around the west side of Vashon Island. Location north of the pointplace the outfall away from the point and related tidal eddies". Strange--I have a detailed current study based upon U. of W. hydraulic model(you are familiar with the Puget Sound Hyraulic Model?)which indicated virtually continuos eddies all around the Point Pulley area. PROBABLY--is that a"Maybe"? Maybe that particle would rather just circulate from eddy to eddy in the vicinity. Seems that in dealing with a project of the magnitude, "MAYBE's" shouldn't be considered. ④

Assume a net southerly flow around Vashon Island. To date this portion of Puget Sound has been able to assimilate the discharge of the existing outfalls into the East Passage. However, neither the Draft EIS nor the 201 Draft deal with the rapid growth of the East Passage adjacent areas. Will this blatant ommission be corrected? Or again, since these areas are not in the Metro Service Area, do we again have an "out of sight, out of mind " situation? And although the Commensement Bay contamination appears to be localized, does that mean that Tacoma & Commensement Bay will not continue to contribute to ecological degradation? With or without an EPA? What about the combined effect in the Tacoma area with the introduction of a MAJOR new East Passage outfall into that Slow Southerly Flow? No mention!!!!!

I make the concession that there is a net southerly flow(although northerly perhaps would have been better)however slow or variable, and that the waters of the East Passage have been able apparently to assimilate current discharges into the ecosystem. But another point which seems to have been glossed over lightly is that as much as 25% or more of the northerly discharge of the flow around Vashon Island through Colvos Passage returns south into the East Passage! (per Dr. Alyn Duxbury, Professor of Oceanography, U. Of W. & his findings with the U. of W. Puget Sound Hydraulic Model) ⑤

Even without the mathematics of an empirical formula for a time/concentration study, this one aspect alone specifies that at some point in the future the East Passage must take on the characteristics of an enlarged Commencement Bay, or closer to home, the lower Duwamish River. You are no longer diluting effluent--whatever the volume--into a totally uncontaminated water system. the level of contaminant concentration must continually increase! To what degree?------ Not mentioned! Not considered? For any other outfall south of Alki Pt.(aside from the suggested Pt. Pulley--and more specifically at Seahurst park or the Lake Burien/152nd St. outfall) the problem would be exacerbated even further due to reduction locally of the net southerly flow, however slow or unpredictable, and to an increase of localized tidal action and current eddies.

So---what are the reasons to not plan on the preferred Alki location?

Cost? There was the comparison at the public hearing of cost differential. The figure promulgated was $100 million more to use the Alki location. But that figure compares Alki to Seahurst Park which is less than desirable as would be the Lake Burien/152nd St. outfall. In comparing Pt. Pulley to Alki, I find the differential per 201 Draft figures to be not $100 million but $76 million (Route C vs. Route D). However, other parameters have obviously been introduced since the pipe to Alki is shown to be 144 inches vs. 120 inches for any of the others. If those outside parameters are removed, all routes could be(and should be for equal comparison purposes) 120 inch pipe. Then, even the 3 pump stations of Route D(vs. the 2 shown for Route C)might only cost $29.4 million vs $32 mil. That is merely based on the per pump cost of Routes A, B, or C. ⑥

Also, a look at the associated easement acquisition costs indicate marked disparity. Using the map on pg. 70, 201 Draft(admittedly a major simplification of the subject), I find Route A with twice the easement segments of Route D, Route B being 4.66 times Route D, and Route C to Pt. Pulley showing an easement required for the full distance at 10.66 times that portion of Route D. Yet the Pt. Pulley Route was allocated only 3 times the easement amount for Route D to Alki. Cheaper land to cross? Maybe some back slapping between Metro and Port of Seattle for the portion of the easement under SEA-TAC Airport? If not, explain the approximate $2.9 million differnetial! ⑦

Summing up the cost comparisons now, I suggest the differential is not $100 million(Route A vs. Route D), NOT $76.9 million(Route C vs Route D with different diameter pipe), but probably less than $30 to $38 million--and you still haven't dealt positively with the geology of the soil for that 27,000 ft. tunnel to Seahurst Park or that of the 33,000 ft. tunnel to Pt. Pulley. You can prove that it will all be("maybe" 95% anyway?)soft tunnelling so that the costs don't increase substantially with more difficult soil--or become prohibitive??? ⑧

Referring to any of the project costs: A-1, A-3, A-5, B-1, etc.---all have the reference back to the underlying requirement. Clean up or reduce the pollution level of the Duwamish River and thus help preserve the annual $5 million valuation of the related salmon fishery. If COST is such a large factor--how are ANY of the alternatives feasible when comparing an expenditure or $300 to $400 million to enhance or preserve $5 million in fish. Yet there is quibbling over whether to go from $279 to $310 million or as high as $357 million or more with no downward adjustments. ⑨ But it could all be in vain with future plans by the Tacoma area to draw down additional water from the Green/Duwamish River system for fresh water supplies. That would further the pollutant contribution levels from surface drainage and any agricultural/industrial run-off to the river system. ⑩

As stated by an EPA representative at one of the public meetings, "Unless an overriding consideration, can be proven, federal grant assistance funds will NOT be made available for other than the least costly proposal." Perhaps, instead of "least costly", Better terminology should be--"most cost effective".

If the aforementioned does not establish sufficient logic or suggest suspect planning, perhaps a detailed report of current conditions by NOAA would aid in the prevention of an East Passage outfall. As I understand it, data has been collected from current indicators in Puget Sound. The project is part of an extensive long term study of the cross sections of various strategic locations. This is not merely a duplication of surface currents as such but a much more comprehensive undertaking with current readings at varying intervals upwards from the bottom. The information should be correlated and be available in approximately 9 months. The compilation should definitely provide a more detailed comprehension than that affoded by the Puget Sound Hydraulic Model as an aid in the decision making process.

I suggest the NOAA Study information to be provided would then establish that "overriding consideration" deemed necessary for federal participation in other than the "least costly proposals" and that it would greatly assist in confirming the fears of many people(including Metro & EPA representatives?)regarding negative impact on East Passage.

I have to assume at this point that Metro & EPA as "co-authors" of the EIS are unaware of the NOAA project or else have chosen to ignore it as a matter of expediency or otherwise.

Rather than seek a least costly solution to meet minimum acceptable and possibly questionable standards--why not approach the entire problem with a differnet viewpoint? Look for the most cost effective methods to achieve the BEST solution possible. No question marks-------to be dealt with 20 years from now!!!

George C. Vermef, Jr.

Gloria L. J. Vermef

Response to George C. and Gloria L. J. Vermef Letter of February 17, 1981

1. Metro has indicated that an outfall to Puget Sound for the discharge of Eastside wastes was first considered in the original 1958 Metropolitan Seattle sewerage and drainage study. At the time of the original Renton treatment plant construction it was more cost-effective to provide a secondary level of treatment with discharge to the Green/Duwamish River than to divert the effluent to Puget Sound. The previous decision is consistent with Metro's approach to focus on the least expensive alternative that protects water quality and public health. That decision did not foreclose the option to construct a tunnel at some future date. When the Renton treatment plant was constructed it was not known when or whether a tunnel to Puget Sound might eventually be required. At that time, the Metro Council committed the resources necessary to monitor the river with the understanding that the Renton effluent could be diverted if water quality problems developed.

2. See General Response Number 2.

3. Alki Point has stronger tidal currents than Three Tree Point; however, there is no indication that currents at Three Tree Point will not be able to adequately dispose Renton effluent. Metro will perform additional studies at Seahurst Park to ensure that a diffuser with adequate dilution (100:1) can be designed.

4. Additional data on eddies at Three Tree Point were included in the Final EIS (Chapter 6). Outfall design studies will attempt to minimize effluent entrainment in shoreward eddies. Experience with eddies around West Point indicates that eddies may influence plume behavior. However, effluent does not "build-up" in the eddies.

5. See General Response Numbers 1 and 2. The Final EIS analyzed the combined discharges of Metro and other south sound dischargers. It was not possible to project future growth in all of the south sound areas, so present loadings were used. Degradation of Commencement Bay and the Duwamish River by toxic materials appears to be related to industrial waste discharges, rather than treated municipal wastewater.

Recirculation of water around Vashon Island has been accounted for in Metro's calculation of a final 1,500:1 dilution ratio. This is approximately the equilibrium seawater:effluent ratio that would be reached in Colvos Passage.

6. See Response Number 21 to Puget Sound Water Quality Committee letter.

7. See Response Number 22 to Puget Sound Water Quality Committee letter.

8. See General Response Number 11.

9. The annual value of the Green/Duwamish fishery is nearer to $10 million, as referenced in the Final EIS. See Response Number 15 to Puget Sound Water Quality Committee letter.

10. Regarding future influences on Green/Duwamish River water quality, the Final EIS considered the effects of increased Tacoma diversions on the water quality of the Duwamish estuary (Chapter 6), and also the general effects of nonpoint source pollution from population growth (Chapter 7).

11. Current velocity measurements in the vicinity of the proposed discharge location would be valuable in evaluating discharge conditions. Metro may obtain such data in its outfall design studies.

2423 SW 172nd
Seattle, Wa. 98166
Feb 20, 1981

RECEIVED
FEB 23 1981
ENVIRONMENTAL EVALUATION BRANCH

U.S. Environmental Protection Agency
Region 10
1200 6th Ave
Seattle, Wa. 98101
Attention: Mr R.K. Mochnick

Gentlemen:

I am writing this letter in response to the EPA summary draft Environmental Impact Statement regarding the recent Metro Wastewater Management Plan. I request that you accept this responce even though it does not meet your Feb 17th deadline.

My principal concern with the Plan as presented is related to the impact at the vicinity of the outfall. I am a property owner of beach property near Three Tree Point (Point Pulley). We have recently supported an L.I.D. effort to clean up our beaches. This represents a personal outlay of close to $10,000 including interest. Our beach is now clean.

page 2

The plan was presented to residents of our area on very short notice on January 13th at the Burien Library. We were told that the outfall would be placed in 200' of water and be 3000' long. I am concerned with the generally deeper water depths that exist ①
at 3000' from shore. Will the 3000' really be the outfall length? In spite of the depth?

I am very concerned with the movement of these wastes shoreward from such an outfall to adjacent beaches. On page 123 your draft EIS ②
states that additional studies are needed at Point Pulley vicinity to determine risks of shoreward transport. I am pleased to see that you recognize this need. I am surprised that you non-the-less seem to concur with the A-3 alternative before such data is available. Can you assure me

that no final outfall selection or even
general alternative selection will be made until
such studies are completed ?

How complete will such studies be ?
Will you use the latest technology
available to conduct such studies ?
I am enclosing pages 515 — 517
ESN 34-11 (1980) on Environmental ③
Protection Studies in Southern France. This
article describes some excellent new
technology for monitoring proposed
outfall performance. Would you consider
similar type high technology studies
for a Point Pulley vicinity outfall ?

I am surprised that Metro chose
to size this outfall for more than
300 million gallons per day ultimate ④
capacity. History suggests that this
capacity will eventually be used. I am
philosophically opposed to overloading any

portion of Puget Sound with such a
major proportion of our county's wastewater.
I propose that North King County should have
its effluent piped into Puget Sound at a
more northerly location. This makes ⑤
a lot of sense when the relatively weak
currents and the recirculating currents
that exist in our portion of Puget Sound
are considered. Furthermore I propose that
the Metro tunnels to Puget Sound be
sized only just large enough to force
this dividing up of the effluent. Is it ⑥
possible that the EPA could support
this philosophy ? Your comments are
requested.

Please recognize that Jan 13th
represented my first significant knowledge
of the Metro plan. It has taken me
until now to find the pertinent documents
& to study them. I ask that my
response be accepted.

Very truly yours,
Eric Denton, P.E

und to exist (i.e. similar E and H plane
tterns) with low cross-polarization
Three papers from the Technical High
hool (Polytechnique) of Lausanne, in
itzerland, were delivered by J.C.E.
sson. The first paper, "TE_{11} Reflection
Open-Ended Circular Waveguides," which
s coauthored by S. Mamane and F.E. Gar-
ol, discussed the use of a flanged
veguide mouth for the nondestructive
termination of the dielectric proper-
es of tissue in biomedical applications.
waveguide is placed right against
tissue which is very lossy so that
ly the field in the immediate vicinity
the interface is of relevance. The
dy, which was theoretical, came up
inst considerable difficulties and
uired numerical calculations of high
plexity. (Besson had previously
lished similar investigations in
ch an open-ended coaxial transmission
e had been used as a probe, and in
ch the first measurements had shown
d agreement with numerical results.)
second paper, "Soil Moisture Determina-
n: Experiments with Passive Radio-
ers," was authored by P. Neylan, C.
zier, and R. Calo from Lausanne and
Schanda and Ch. Matzler from the Uni-
sity of Berne. They found an experi-
tal relationship between emissivity
soil moisture content, particularly
middle-heavy and light soil; however,
y also found a strong dependence
surface roughness and interfering ef-
ts of vegetation cover. The third
er concerned current distributions
microstrip radiators.
A very clever and ingenious antenna
described by workers from Thompson
in France, in a paper titled "The
smatic Array Antenna, a Nondisbursive
veling Wave Array Antenna," written
S. Drabowitch and H. Dudome and pres-
ed by the latter. The antenna uses
end-fed waveguide feed-Array (e.g.
h slots or dipoles) which gives a beam
t squints at some angle off broadside.
squint angle is a function of the
ment spacing in terms of wavelength
is therefore frequency dependent.
radiation from the waveguide is con-
ned between parallel plates and is
ercepted at some angle by what amounts
a lens formed by an array of a combina-
n of receiving horns, phase-shifters
transmitting horns. The phase-shifters
e substantially frequency independent
se-shift and are arranged in such a way
t a beam comes off at broadside to the
t aperture. The frequency independent
se-shift causes the radiated beam to
scanned as a function of frequency.
various constants were chosen such
t this scan cancels that scanning which
due to the end-fed feed-array. A sub-

stantially frequency independent beam-pointing system was obtained by this method. In this writer's opinion there are simpler methods of obtaining beams from line sources that do not scan with frequency and that have less complex hardware requirements; this compensation method, interesting and ingenious as it is, is not likely to find a cost-effective practical application.

The conference covered many subjects and achieved broad participation from all over Europe. Regrettably, many of the presentations had viewgraphs that were so cramped with illegible handwritten equations and information as to become indigestible. They also tempted the speaker to become an equation reader. It seems universally difficult to get speakers to present ideas in their talks, relegating equations to the written text or its appendix. If that can ever be achieved, perhaps it also will eliminate some of the papers that show admirable skill in solving very difficult but regrettably unimportant problems. (T.C. Cheston)

ENVIRONMENT

ENVIRONMENTAL PROTECTION STUDIES IN SOUTHERN FRANCE

Le Centre d'Etudes Techniques de l'Equipment d'Aix-en-Province is one of six regional centers in France which combine some of the activities that in the US are performed by the Army Corps of Engineers, the Environmental Protection Agency, and the Department of Transport. The center in Aix-en-Provence is the largest, with 650 employees. These centers are jointly administered by the Ministry of Environment and Quality of Life and the Ministry of Transport. They were originally set up to handle engineering and other problems associated with the postwar explosion in highway construction and this is still their primary occupation. However, they have branched out into many other fields including land management and urban planning, urban and interurban traffic control, highway safety, public hygiene, harbors and waterways, information and management systems, management of economics and finance, architecture, and all types of civil engineering, and protection of the environment. Research, design, and management studies are made for governmental bodies at all levels as well as for private companies and individuals.

This article is concerned with environmental studies. One subject of interest to me after 22 months in noisy London is traffic acoustics. Noise levels associated with traffic come under serious

consideration at the center. Acoustics are taken into account in the design and placement of highways and in the materials used in them. Architects of proposed apartment houses and office buildings that are to be built close to busy highways may come to the centers to receive concrete advice on how to sound-insulate to keep traffic noise at an acceptable level within the structures. Center employees monitor noise levels within the buildings after they have been constructed to determine the effectiveness of their advice.

There are several individuals working on various aspects of marine pollution. Dr. Claudine Valerio and her collaborator, Engineer M. Llebaria (Laboratoire d'Astronomie Spatiale, Marseille) have developed a quantitative multispectral remote-sensing system employing aircraft and cameras to measure rates of mixing and diffusion and movement of pollutants near shore. It is used primarily in the planning for improving sewer outfall systems.

Rhodamine dye is introduced into coastal waters through an existing sewer outfall or at the location where one is proposed. An airplane flies over the area for about 8 hours taking frequent photographs of the dye plume at various stages of the tide. Two cameras are used. Filters are employed so that one camera photographs light at the wavelength of the peak of fluorescence and the other photographs the blue part of the spectrum outside the spectra of the rhodamine. The negatives are digitized on a PDS 1010A microdensitometer of very high accuracy. A computer is then used to calculate the amount of dye in a vertical column extending from the surface down to the bottom of the plume (depth = z) at grid points (100μ × 100μ) on the negatives. The quantity of dye, q(z), is then contoured in g/cm². Corrections are made for experimental conditions: the angle from which the light is coming, sea and swell, and turbidity.

Density on negatives is calibrated in terms of illumination and then q(z) in several ways. First the water is sampled at several depths and at several locations in the plume and the dye concentrations are determined in the laboratory with a fluorescence detector. After integrating q(z) with depth the results give the amount of dye where each set of vertical samples was taken. The relative value of illumination is then plotted against this amount. Valerio has developed a theory of fluorescence that links the known total quantity of rhodamine dye in the plume directly to density distribution of the negatives, and contours can be accurately drawn without actual samples. The system is accurate to within 5 percent.

The synoptic contoured picture of the dye distribution resulting from aerial photographs which cannot be obtained in any other way is extremely useful in determining the rate of dispersion of effluents as well as where the plume moves as tidal currents change speed and direction.

The first major study was off Propriano, a resort city on the west coast of Corsica. During summer the population there increases by a factor of 10. Local authorities wanted to know if any effluent from the present sewer outfall approached the local swimming beaches. Local currents were measured by following the paths of floats with sequential air photography, while rhodamin was continuously released through the outfall and photographed from the air.

The study showed that sewage would come into beaches during some phases of the tide and under certain wind conditions. In order to continue to use the present outfall and not pollute the beaches, the sewage would have to be thoroughly treated before discharge.

Another study is underway off Atibes near Nice to locate the distance from shore that would be optimal for a new sewer outfall. First discrete amounts of dye (600 g) were placed in three locations, three times a day and were followed by aircraft photography. A "guessed" best location was selected from these observations, and a continuous source of dye plus floats will be used in a study similar to the Propriano study. The method is now fully operational.

Valerio has studies in progress at several locations on the south coast of France where she is observing the movement of visible effluent from outfalls near high cliffs. She mounts a spectrophotometer on the top of each cliff. The areas around the outfalls are very slowly scanned by optics focused on the spectrophotometer and over the visible and near-infrared part of the spectrum. The color of the waste water is clearly seen through the use of four narrow-band filters. The results of the spectrophotometer studies are used to determine the most useful spectral channels for more detailed aircraft data acquisition in order to obtain photographs with the highest contrast. The aim of these studies is to develop an efficient methodology for inventorying coastal pollution. The spectrophotometer is calibrated with clean water and has a reference beam focused on a white cloth to take into account variations in sunlig

I also talked with Mme. G. Bicheron, head of the chemistry group at the center. This group is also working on marine pollution research. It is doing a pilot

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study on the influence of currents on concentrations of pollutants in a laboratory tank. It is studying the rate of disappearance of several forms of bacteria at the interface where urban sewage meets salt water and the sea. The group is also carrying out a controlled laboratory study of the effects of various concentrations of salt water from 0 to full sea water at various temperatures on several species of bacteria.

It was stated above that the main job of the laboratory is to carry out research on highways. At the time of this writing, a tight money situation had slowed down the rate of new highway construction and enabled the laboratory to divert funds to its study of marine pollution. Some of the increased effort will go into research on thermal pollution from nuclear power plants.

After visiting the center I had time to visit Laboratoire d'Astronomie Spatiale in Marseille, a part of CNES, the Centre National d'Etudes Spatiales. I was given a demonstration of the very elaborate computer system used for manipulating all forms of digital processed imagery such as Valerio's photographs and astronomical photographs. A relatively simple conversational programming system was used that gave a wide range of ways of presenting these data on a screen. Relatively untrained people can use the system. (wayne V. Burt)

MATERIALS SCIENCE

COMPOSITES, AIRCRAFT, AND LIGHTNING

~~During the spring of 1980, two meetings concerned with the use of composite materials in aerospace construction were held by the Advisory Group for Aerospace Research and Development (AGARD) of the North Atlantic Treaty Organization (NATO). The first meeting, entitled "Effect of Surface Environment on Composite Materials," was held in Athens from 14 to 17 April. The second, "Electromagnetic Effects of (Carbon) Composite Materials Upon Avionic Systems," took place in Lisbon, from 16 to 19 June. I was able to attend only the Lisbon meeting, but fortunately, mr. G. Jubé, who had been the chairman of the Athens meeting gave a detailed overview of that meeting during the meeting in Lisbon. In this article I summarize Jubé's talk and review the Lisbon meeting which had to do with the ability of composite material to shield avionics systems from electromagnetic (EM) radiation. Taken together, these two meetings give a fairly comprehensive view of the extent to which composite materials, especially carbon-fiber reinforced plastics (CFRP), are replacing aluminum and titanium alloys in aircraft construction, as well as the problems associated with this replacement. Proceedings of these meetings will be published by NATO (obtainable from the Report Distribution and Storage Unit, NASA Langley Research Center, Hampton, Va. 23661).~~

~~It is useful to realize the extent to which composites are being used in both military and civilian aircraft. Therefore, before discussing Jubé's review of the Athens meeting, I would like to describe the talks by his two companion speakers during the first session of the Lisbon meeting: Dr. R.W. Leonard (NASA, Langley Research Center) and Mr. T. Sharples (British Aerospace Aircraft Group, Warton, Preston, UK).~~

~~Leonard described the NASA Aircraft Energy Efficiency Program (ACE) which is specifically directed to the introduction of composites into passenger aircraft: the upper/aft rudder on the DC10, the elevators on the Boeing 727, the inboard ailerons on the Lockheed 1011, and the spoilers on the Boeing 737. In each case no more than 20 aircraft are involved and the weight saving is insignificant. The program's purpose is to develop experience and confidence in CFRP for aircraft structures. These tests on the 727 are especially important to Boeing because the company plans to incorporate a substantial amount of composite material (1300 kg) into the 767 which is expected to go into production in 1982. There will be an even larger amount of corporate material in the 757 which is due for production in 1983. The composite materials going into the 767 and 757 will all be secondary structures rather than primary, load-bearing structures.~~

~~Composites are already used extensively on military aircraft where weight-saving (and thus payload and/or range) is at a premium. Leonard noted that in the F18, for example, there are over 1,000 pounds (9.9% of the total structural weight) of CFRP, largely in wing, stabilizer, and rudder-skin structure. The AV-8B V/STOL (vertical and short takeoff and landing) comes close to being an "all composite" aircraft. The forward fuselage as well as most of the wing and tail structure is fabricated from CFRP.~~

~~Sharples discussed the advantages and disadvantages of CFRP, and explained some of the economic factors. He pointed out that it is more realistic to use composites in lightly-loaded structures, such as the front fuselage section, where significant weight saving can be realized, than in highly-loaded structures such as the root section of a wing. Such structures require complex laminate layups, but achieve only negligible weight savings. Besides the obvious fuel savings~~

Response to Erin Denton Letter of February 20, 1981

1. See Response Number 18 to Puget Sound Water Quality Committee letter.

2. See General Response Numbers 1 and 15.

3. Oceanographic studies will be designed to ensure that an outfall diffuser can achieve 100:1 initial dilution. Also, see General Response Number 15.

4. See Response Number 4 to Jeanne L. Snell letter.

5. The final plan recommended program leaves open the option of effluent from the north part of the study area being discharged via an ocean outfall from a Kenmore treatment plant.

6. Sufficient capacity is currently provided in the proposed outfall to accommodate flows from the north part of the study area, and if these flows are not diverted to the Renton plant, capacity considerably in excess of 50-year needs would be present. EPA, by its regulations, is not allowed to fund outfall capacity above 20-year needs, or if certain findings are made, 40-year needs. EPA as a general rule may not restrict the size of the outfall to 20-year or 40-year needs, but rather requires capacity in excess of these needs to be paid for entirely from local funds.

[illegible]
FEB 23 1981
ENVIRONMENTAL EVALUATION BRANCH

THOMAS J. TAAFFE
DOUGLAS H. MORELAND
ATTORNEYS AT LAW
417 SOUTHWEST 152ND
SEATTLE, WASHINGTON 98166
TELEPHONE (206) 243-4900

RECEIVED
FEB 19 1981
LEGAL SUPPORT BRANCH

February 18, 1981

U. S. Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, WA 98101

Attention: Roger K. Mochnick M/S 433

M/S 433

Re: Metro Tunnel Renton-Puget Sound

Dear Mr. Mochnick:

I am a resident of the Gregory Heights area which overlooks Puget Sound near Three Tree Point - Seahurst.

I have reviewed a ream of material mostly objecting to the proposed effluent tunnel. It is obvious that many intelligent and motivated people have presented cogent arguments against the proposal and have taken a great deal of time to support their arguments with scientific and statistical evidence.

It seems to be, that argument after argument omits what I consider to be the long-range disaster ticking away behind the proposal.

It is true that there are serious immediate problems resulting from the discharge effluent - even secondarily effluent - into Puget Sound this far south. The problem will be doubly compounded if Metro ever obtains a waiver to allow only primarily treated sewage to be dumped into the Sound. But the real problem lies with the fact that this tunnel will make it easy in the future to justify increasing urban sprawl. I refer specifically to continuing development through the farm lands to the east. This is the real pea under the shell of this proposal. The advocates of what is mistakenly considered to be progress have every intention of expanding development in King County and the surrounding area eastward from Puget Sound to the Cascade Mountains. This is not an idle statement. Talk to the real estate brokers and the land speculators. They will tell you where the "action" is. ①

The problem is that development to the east will be doubly disasterous for the ecology of this area. The damage to the physical environment by increased sprawl and development is obvious. The damage to the environment by an increased drain on natural resources

and drain into natural resources which is the subject of this letter is equally obvious. The increased demands on our transportation system and our very limited energy resources as a result of expended development is less obvious. But the fact is, the more sprawl the more transportaion required. It is axiomatic.

Obviously, the proposed sewage tunnel is not going to be the cause of urban sprawl. But it will make urban sprawl so much easier. How easy it will be for future developers to explain to the environmental protectors of the future, how neat and clean our developments will be because of the sewage system. How much more difficult it will be for them to complete their plans if it is not so easy for them to dump their mess in Puget Sound many miles to the west.

Very truly yours,

Tom Taaffe

Thomas J. Taaffe

ns

Response to Thomas J. Taafe Letter of February 18, 1981

1. EPA recognizes the role of the Wastewater Management Plan in accommodating urban growth, and has devoted an entire chapter of the EIS (Chapter 7) to considering the adverse environmental impacts of growth accommodated by the plan. EPA has also listed mitigation measures to avoid or reduce these adverse environmental impacts. The Metro plan is consistent with approved EPA population projections and with local land use plans, and EPA may not refuse to fund the Wastewater Management Plan merely because it provides capacity to accommodate planned-for urban growth.

2-24-81

Roger Mocknick, m/s 443
EPA, Region X
1200 - 6th Ave.
Seattle, Wa. 98101

Dear Mr. Mocknick,

We are against A-3. We do not want the sewer brought to Seahurst Park or the base of S.W. 152nd St. ①

RECEIVED
FEB 25 1981
ENVIRONMENTAL EVALUATION BRANCH

Karen x Mel Barbian
14655 - 22nd S.W.
Seattle, Wa. 98166

Response to Karen and Mel Barbian Letter of February 24, 1981

1. No response required.

Barry C. Maulding
General Counsel & Assistant Secretary

February 23, 1981

Neil Peterson
Executive Director, Metro
Exchange Building
821 - 2nd Avenue
Seattle, WA 98104

Re: Renton 201 Study

Gentlemen:

I am very upset with Metro's apparent approval and recommendation to adopt the Metro preferred plan for dumping sewer effluent from the East side of Lake Washington into Puget Sound in the Seahurst/Pt. Pulley area.

Complete studies need to be conducted to indicate the biological damage to marine and shore life with a 100 million gallon per day dump into one low current Puget Sound location.

① Our intuition tells us that pumping this volume of effluent per day into an area of relatively low current, tide and eddy activity significantly increases the probability of eventual fouled beach water and contaminated shellfish. Metro officials admit to a possible 250:1 dilution at the shore line is probable. At best, this option is a calculated risk where the stakes are very high.

② There are alternatives other than Seahurst that make a lot more sense from an environmental and economic perspective. Adopt one of your own, but slightly more costly alternates (B1), to treat the effluent to a higher degree discharging as presently is done, with the additional load routed through Kenmore to the North Sound for a two location effluent dump into a high current area. The additional cost of $.50 per month, per household, appears the most palatable solution to reduce the ever increasing total Puget Sound pollution problem.

RECEIVED
FEB 25 1981
ENVIRONMENTAL EVALUATION
BRANCH

Alaska Airlines, PO Box 68900, Seattle, Washington 98188, (206) 433-3139

I resent your encroachment on our community with this expedient approach. Long after the planners and researchers have moved on, we will have to live with the beaches and water in our community. Please give us the same consideration that you would if you lived here yourself.

Collectively, we as citizens of Seahurst, are firmly united and organized against this proposal. We are prepared to exhaust every available political and legal avenue to halt this development.

Sincerely,

Barry C Maulding
Barry C. Maulding

BCM/mm

cc: Roger Mochnick M/S 443✓
Ron Dunlap, County Executive
Paul Barden, Councilman
Editor, Seattle Times

Response to Barry C. Maulding Letter of February 23, 1981

1. See General Response Number 1.

2. Alternative B-1 would not completely protect water quality and fisheries in the Duwamish River. This consideration, in addition to its higher cost, was the reason it was not selected.

12009 30th Ave. S. W.
Seattle, Wa. 98146
25 Feb. 1981

RECEIVED
FEB 26 1981
EVALUATION

Enviornmental Evaluation Group
E. P. A.
1200 6th Ave.
Seattle, Wa. 98101

Attn: Craig Partridge

Gentlemen:

The following summarizes my telephone conversation of this morning with Mr. Partridge.

The discharge proposed by Metro from their Renton Secondary treatment plant is not going to be well received by the local beach property owners and dwellers in the proposed outfall areas near Seahurst Park and Three Tree Point (Point Pully). I have talked with my neighbors and without exception they were willing to sign a protest petition.

This proposal has raised questions about giving the discharge additional treatment at the plant to then enable continued discharge into the Duwamish River. Other cities as Denver, Fort North and Dallas have some way to dispose of their sewage without piping it to saltwater. ①

If Bellevue is a "Quality Town" why can't they treat their sewage in a better manner than to dump it into the Sound to let the Salt Water "take care of the problem" in the beach dwellers front yard? ②

The discharge in the Seahurst/Three Tree Point area will flow southward to Tacoma and thence northward through Colvos Passage whereas the discharge from West Point, and partially from Alki Point, is carried more directly northward to go out the Straits.

A number of boat owners have questioned the equitability of requiring pleasure boats to have holding tanks and treatment equipment when the quantity of discharged matter every day from the Renton plant will far exceed, even after secondary treatment, the total from all the boats in the area. ③

Information regarding the Coast Guard enforcement of EPA regulations on small boat sewage discharge was obtained by calling 442-5350. The Coastguard was required by "33USC 1322" of 18 Oct. 1972 to enforce EPA standards Part140, Title 40 CFR and 33 CFR Part 159 for enforcement. Further information may be obtained at the above phone number. I hope this can help you reduce the inequity of regulations between sewage plants and small boats.

Yours truly,
Louis Smithmeyer
Louis Smithmeyer

Response to Louis Smithmeyer Letter of February 25, 1981

1. The alternative of continued discharge to the Green/Duwamish River with nitrification of the effluent (Alternative A-1) was evaluated, and it was determined that reliability problems would result and that risks to the Green/Duwamish River fishery would still be present. It is true that inland cities such as Denver, Fort Worth, and Dallas discharge wastewater without ocean outfalls, but these cities have no choice in that ocean discharge would be prohibitively expensive. As a general rule, ocean discharge of effluent is preferable to surface water discharge due to the greater diluting and dispersing capabilities of ocean waters.

2. The Renton effluent would receive secondary treatment, which is a higher level of treatment than most existing waste discharges to Puget Sound.

3. Marine sanitation devices are regulated by EPA and the Coast Guard under authority of Section 312 of the Clean Water Act. Regulations are intended to control localized health and aesthetic problems in nearshore areas, resulting from discharge of raw sewage from boats. Problems include hazardous levels of bacteria and floating fecal material near marinas, bays, and narrow inlets where public use is concentrated. On the other hand, discharge of secondary treated, disinfected municipal sewage effluent far offshore, even in relatively large volumes, does not lead to these localized problems. It is true that discharges from boats probably pose no threat to Puget Sound as a whole; marine sanitation device regulations are aimed at more localized problems. Therefore, there is no inconsistency between approval of a discharge of treated effluent in Puget Sound and control of raw sewage discharges from boats, even though the contribution of conventional pollutants to Puget Sound is greater from the treated effluent.

January 22, 1981
211 SW 196th Place
Seattle, Wa. 98166

Municipality of Metropolitan Seattle
Exchange Building
821 Second Avenue
Seattle, Wa 98104

RECEIVED
JAN 27 1981
ENVIRONMENTAL EVALUATION
BRANCH

Attn: Ms. Gerry Larrance, MS 73

Re: Comments, Renton 201 Study

Dear Ms. Larrance,

I was pleased to see the large turnout at the January 13th meeting at the Burien Library. Although I was able to make one point at the meeting, I would like to add several more comments for the record, even though they probably have already been submitted by others who live closer to the proposed outfall.

EIS Concerns

My experience with EIS documents has been that the projected impact does not appear to be a problem as documented, but then a year or so later, after the development has been made, no-one is responsible to follow-up and ensure that the design functioned as planned and to force corrective ① action in the event the design does not work as promised. This leaves the burden on some impacted property owner to sue a government; which is a very expensive recourse. Another experience has been that agencies have these public hearings, record the publics' comments and concerns; and then go ahead and do what they wanted to do in the first place. ②

The biggest problem I see with this EIS, however, is that it is being prepared by EPA. Who, then, is representing the people in an impartial manner? It is not right for the agency that is chartered to review and approve the EIS to be the one working with METRO in the preparation of the document, especially when the impact is broader that the area covered by the EIS such as outside the METRO service area. EPA should immediately disassociate themselves from the Renton 201 Study EIS preparation so that they may impartially review the future proposal. ③

Inadequate Master Plan

The Renton 201 Study appears to have been developed without due consideration of the requirements/plans of adjacent areas. In my opinion, the plan to divert (I question the legality) large quantities of sewage from other drainage basins, as far north as Bothell, to an allready overloaded plant at Renton while a large amount of land south of the Renton plant and in the same drainage basin is yet to be developed. This is not fair to the south end of the county. I recognize that a large part of the problem is the lack of a King County Planning Commission properly constituted per RCW 36.70, that will ensure equitable development and controls over the entire county. METRO, however, has to recognize that its planning has a tremendous impact upon land use and that it is very important to put this Renton 201 Study into perspective. That was not done. Most casual observers of the planning process do not consider Bothell to be a part of Renton. ④ For example, I understand that after the repair of the West Seattle bridge, the Port of Seattle hopes to widen the Duwamish River to 300 feet and deepen it enough to allow large ocean going ships to come

---

up as far as Ox-Bow (near the Boeing Development Center). This could have a large impact on the capability of the river to handle the Renton plant's waste due to the salt water inflow. Is that a hidden reason for this diversion tunnel proposal? I did not see any statement of the Port's plans in the summary EIS statement. ⑤

There was no discussion in the meeting on why the waste from the west side of Lake Sammamish, that currently is going to West Point, should be diverted to Renton. Is that so the Richmond Beach plant can be closed? There was no indication of the expected growth of the North Seattle area as a justification for the off-load of the majority of the north county waste to the Renton plant. Alternative B-1 included a 75% expansion of the Renton plant so that was not really an alternative that would help the south end. ⑥

From my experience as an engineer, I seriously question all of your dollar comparisons. For example, a better understanding of the soil/rock characteristics for the tunnel routes can easily double the cost of the tunnel making that plan the most expensive. In addition, the total cost of the future trunks and pumping stations required to divert waste from Bothell to Renton must be added to the development costs. You should ask your consultants to provide a band of costs for each estimate so that you have a best/worst cost range upon which to base your decisions. This is because various types of construction have quite large deviations in the accuracy of a cost estimate. I doubt if METRO is much better than WPPSS in controlling the costs to incorporate mandatory or "make work" design changes in a construction contract. In other words, I believe that the relative cost data should take a back seat in all areas except where you can clearly show a large difference in operating costs after construction is completed. ⑦

As I proposed in the meeting, I believe that waste waters should not be diverted to the overloaded Renton plant but diverted north to a new facility. ⑧ In fact, the proposed plan appears to be an illegal diversion of wastes into another drainage basin. ⑨ With careful planning, you could also bias the new developments of industrial facilities so that a better centralization of industrial toxicants can be maintained to reduce operating costs. I believe you still have the ability to bill a customer for the extra costs of handling his toxic wastes. A plan should search for a method that would divert the toxicants from many small industrial plants to a customized treatment facility that can handle the waste in a most cost efficient manner. Not all companies can afford to spend as much as we do at Boeing to treat wastes. All these ideas should be incorporated into a new 201 plan for the north end of the county. ⑩

Local Impact

The Renton 201 Study proposes to load the "drainage capacity" of the Highline area with 99,000,000 gallons per day of grey water. We are not in METRO. Within Highline, we have a relatively large number of areas that are currently not on sewers and need to be annexed. If we continue with current "residential" developments for the Highline area, there will be little generation of toxicants and hence no need to expand our plants to secondary treatment. The only doubt I have in that area is the large growth of industrial park type plants in the area between the SeaTac airport and Des Moines planned by the Port of Seattle. That may result in a large amount of toxicants being directed to the Des Moines Sewer District and hence require secondary or better treatment.

Probably some control on the type of industry should be imposed; however, I do not know who would face up to that---a political hot potatoe. There are, therefore, many factors that must be studied in a "Highline Area 201 Study" before we will know the ability of the area to accept any of the Renton output after meeting the needs of our local Sewer Districts.

I believe that you now recognize that the Renton201 Study recommendation is not acceptible to the Highline and West Seattle areas. I strongly recommend you table the study pending completion of similar 201 studies for the rest of King County. You need a much more complete story to achieve credibility and endorsement of your proposal. When the people of Highline recognize that you plan to shut down the Alki plant and divert that waste water to Renton and thence to Highline, they will be very unhappy. It does not appear that your proposal will ever be acceptable.

Sincerely,

Ray Pedersen

Ray Pedersen

CC: Environmental Protection Agency
Southwest Suburban Sewer District
Des Moines Sewer District
Lake Haven Sewer District
Highline Community Council

Response to Ray Pederson Letter of January 22, 1981

1. Although in general monitoring of environmental impacts following completion of an environmental assessment is often lacking, in the case of the Metro Wastewater Management Plan, detailed oceanographic and biological studies will be conducted during the design of the project, and Metro is committed to a long-term monitoring program for water quality and biological impacts of the Renton discharge to Puget Sound. Also, the Washington Department of Ecology issues and enforces effluent discharge permits for treatment plant outfalls, which contain requirements for effluent characteristics.

2. See General Response Number 13.

3. See General Response Number 13.

4. The final plan recommended program defers the decision on where to treat wastewater from the north part of the study area to the Renton plant, thus reducing interbasin transfers of wastewater.

5. See General Response Number 3.

6. See Response Number 4 above.

7. See General Response Number 11.

8. See Response to comment Number 4 above.

9. See Response Number 9 to City of Normandy Park letter.

10. Regarding cost allocation to industrial uses, see General Response Number 12. Decisions on zoning for industrial development are the responsibility of local general purpose governments, not Metro or EPA.

11. There is no obvious relationship between selection of a wastewater management plan for the Renton study area and meeting the long-term sewerage needs of the East Passage area. If the commentor assumes that Puget Sound has a highly limited assimilative capacity for wastewater that future discharges from East Passage communities would completely utilize, there is no evidence to support this idea.

February 1, 1981

Ms. Gerry Larrange
METRO
821 Second Avenue
Seattle, Washington 98104

FEB 3 1981
ENVIRONMENTAL EVALUATION BRANCH

RE: RENTON 201 STUDY

Dear Ms. Larrange:

Your proposal to dump sewage outfall from Metro's Renton treatment plant to Three Tree Point is totally unacceptable for the following reasons:

1. Currents would send the effluent south instead of flushing it directly north out of the sound ①
2. Protection of valuable salmon and sea life in Puget Sound would be threatened from lingering sewage that would lie in South Sound.
3. This outfall is not "our" sewage as it originates from Kent, Bellevue and Mercer Island. Furthermore, Metro doesn't even serve us at Three Tree Point. ②
4. S.W. Surburban Sewer District already operates two outfalls to serve our local needs and unlike Metro, they don't include any wastes from heavy metal industries. ③
5. There is also a matter of principle. Should Metro which does have legal authority be able to jam down the throats of people it doesn't serve a project they don't want?? ④

There are alternatives that would both save the Duwamish and keep Metro off our Beaches. One option that looks very good, but was left out of Metro's draft plan would be to pipe the effluent from Renton down the Duwamish, out of the mouth of Elliott Bay and discharge it deep into the northerly currents of Puget Sound. This idea was too hastily dismissed and deserves at least as much consideration as any other. It appears to be environmentally sound and has little or no impact on residential areas. It was pointed out however, that the costs of piping down the Duwamish was very little more than piping to Three Tree Point. After the small difference is prorated among all those being service, it would amount to nothing compared to the problems and costs you would incur in cleaning up the sound at a later date. ⑤

Your reply to this alternative would be appreciated.

Sincerely,
A very concerned citizen of
South Sound Three Tree Point.
Carolyn Bolstad

Carolyn Bolstad
16047 Maplewild S.W.
Seattle, Washington 98166

cc: EPA Region X
1200 Sixth Avenue
Seattle, Wa 98101
Attn: Roger Mochnick
M/S 443

Response to Carolyn Bolstad Letter of February 1, 1981

1. See General Response Number 1.
2. See Response Number 1 to City of Normandy Park letter.
3. See General Response Number 2.
4. See Response Number 2 above.
5. See Response Number 9 to Beth Savage letter.

February 9, 1981

RECEIVED
FEB 18 1981
ENVIRONMENTAL EVALUATION BRANCH

To: Neil Peterson
Executive Director, Metro
Exchange Building
821-2nd Avenue
Seattle, Washington 98104

Re: Renton 201 Study

I am extremely angered at your agencys' apparent approval and recommendation to adopt the Metro preferred plan for dumping sewer effluent from the East side of Lake Washington into Puget Sound in the Seahurst/Pt. Pulley area.

No complete studies have been conducted to indicate the biological damage to marine and shore life with a 100 million gallon per day dump into one low current Puget Sound location.

Our intuition tells us that pumping this volume of effluent per day into an area of relatively low current, tide and eddy activity significantly increases the probability of eventual fouled beach water and contaminated shellfish. Metro officials admit to a possible 250:1 dilution at the shore line is probable. At best, this option is a calculated risk where the stakes are very high.

There are alternatives other than Seahurst that make a lot more sense from an environmental and economic perspective. Adopt one of your own, but slightly more costly alternates (B1), to treat the effluent to a higher degree discharging as presently is done, with the additional load routed through Kenmore to the North Sound for a two location effluent dump into a high current area.

This additional cost of 50¢ per month, per household, appears the most palatable solution to reduce the ever increasing total Puget Sound polution problem.

We resent your encroachment on our community with your quick fix approach. Long after the planners and researchers have moved on, we will have to live with the beaches and water in our community. Please give us the same consideration that you would if you lived here yourself.

Collectively, we as citizens of Seahurst, are firmly united and organized against this proposal. We are prepared to exhaust every available political and legal avenue to halt this development.

①

Thank you,

V Selivanoff
14617 25th SW
Seattle 98166

cc: Roger Mochnick M/S 443
1200-6th Avenue
Seattle, Wash. 98101

Paul Barden

Seattle Times & Seattle P.I.

Response to V. Selivanoff Letter of February 9, 1981

1. See Response to Barry C. Maulding letter.

Seattle, WA
February 18, 1981

Mr. Neil Peterson
Executive Director, METRO
Exchange Building
821 - 2nd Avenue
Seattle, WA 98104

Reference: Renton 201 Study

Dear Mr. Peterson:

I am hereby registering my strong protest against your plans A3 and A5 for discharging sewer into the Puget Sound waters along the shores of West Seattle and points south.

It seems to me that A-1 is the most sensible approach even though the cost may be greater. I suggest that you personally take a good look at the water near the shore on incoming tide - a nice warm summer day along Seola Beach, and see if you would like to swim in the cesspool that already exists by the discharge from the existing sewer treatment plant in Shorewood.

It is hard for me to believe that any expert in the sewage disposal field could conceive and propose plans which will add to already existing problems.

①

Should you, against better judgment, select either the A3 and A5 plan for implementation, rest assured that I myself and many of my fellow community menters will initiate whatever legal steps are necessary and appropriate to stop such an unreasonable, expensive and ill-conceived plan.

Sincerely,

Lars Holmberg
12515 Shorewood Ln. S.W.
Seattle, WA 98146

cc: Ron Dunlap
Paul Barden
✓Roger Mochnick
Hamilton Underwood
Betty Lunz
Cheri Zehner
Charles Henry

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ENVIRONMENTAL EVALUATION BRANCH

Response to Lars Holmberg Letter of February 18, 1981

1. The Renton discharge would be designed to be far enough offshore and of sufficient depth to maximize dilution and minimize shoreward contact. Field studies would be undertaken to conform to the suitability of the location. No major water quality impacts are predicted with a Seahurst Park discharge. (See General Response Number 1.)

February 24, 1981

Mr. Neil Peterson
Executive Director
Metro
Exchange Building
821 Second Avenue
Seattle, Washington 98104

RE: Renton 201 Study

Dear Mr. Peterson:

I am writing to express my strong opposition to Metro's preferred plan to dump sewer effluent from the east side of Lake Washington into Puget Sound in the Seahurst/Pulley Point area.

It seems incredible to me that this low current, low tidal activity area would even be under consideration. As I understand your plan it will involve the dumping of 100 million gallons of effluent per day and that will certainly increase with the passage of time. I do not believe that the Seahurst/Pulley Point area can handle that huge amount of sewage. ①

It may be more costly but I would favor the route through Kenmore to the North Sound area. As a resident of Seahurst I would like to see consideration given to the protection and preservation of the delicate balance of sea life in Puget Sound. ②

I believe this plan would seriously increase the already present pollution level of the Sound. I think that now is the time to give more thought and perhaps spend more money to go with the safest alternative we can find for Puget Sound, not the most convenient plan. Seattle's environmental quality has been decreasing at an alarming rate and I think you owe it to the people of the Puget Sound area to give a more thoughtful appraisal to a plan that will benefit and insure that the quality of Puget Sound remains for everyone to enjoy now and in the future.

Sincerely,

Nancy Hahn
12221 Shorewood Drive Southwest
Seattle, Washington 98146

cc: Charles Henry
Director of Water Pollution Control

Roger Mochnick
EPA, Region X

Ron Dunlap
County Executive

Paul Barden
County Councilman

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FEB 26 1981
ENVIRONMENTAL EVALUATION
BRANCH

Response to Nancy Hahn Letter of February 24, 1981

1. See General Response Number 1.

2. The final plan recommended program defers the decision on where to treat flows from the north part of the study area.

RECEIVED
MAR 3 1981
ENVIRONMENTAL EVALUATION BRANCH

15004 24th SW
Seattle, 98146
Feb. 25, 81

Roger,
The more
I've studied A-3 the
[illegible] it sounds
[illegible] now
brilliant
[illegible] can
plan approve
– K P

To: Neil Peterson
Executive Director, METRO
Exchange Bldg.
821 2nd Ave.
Seattle, WA 98104

Re 201 Renton Study

① I am absolutely appalled at your preferred plan (A-3) to pipe sewage from Renton to the Pt. Pulley area. To take such a huge volume of sewage & dump it at one place goes against nature's capacity to process it. Reliable sources have stated that our beaches would be unswimmable & our clams uneatable. The EPA's own EIS states "... localized increases in ammonia & heavy metals ..." An EPA letter from Roy Ellerman

② (Jan. 21, 72) states "... nondegradable waste constituents will remain in the area for long periods

Hence I not only dislike your preferred plan (A-3, from a water quality standpoint, I strongly resent the turmoil caused by the construction

2

③ of such a huge pipeline. I resent Metro invading our community when we aren't even served by you. I resent you indirectly

④ lowering my property value. I resent your inadequate & incomplete study of our tides,

⑤ currents & eddies which will result in the ruin of our beaches. I resent the

⑥ discharging of 100 m.g.d. effluent into southern Puget Sound when 18 outfalls are already in use. You have not dealt with the financial & ecological consequences to the communities outside of Renton nor

⑦ have you given an overall, long-term impact statement covering all of Puget Sound for many years to come. I thoroughly resent your quick-hit, short-term preferred plan A-3.

⑧ As far as what to do with the heavy volume of sewage — you have explored many alternatives already. B-1 looks attractive as does A-1 especially if the effluent were carried by pipe down the Duwamish. I believe Metro has an overall responsibility to upgrade all sewage to at least secondary level & to discharge it at many strategic points

3

located the length of the service area. One community should not be forced to handle the garbage from an entire, growing service area. I would also hope that you would finance & explore even more productive ways of treatment
⑨ such as drying it (MidWest does this) or upgrading it in liquid form so it could be used as irrigation etc. Use this stuff, don't waste it. Why not become leaders in waste disposal? The people of Seattle have proven through elections & other public expressions that they are very willing to pay for water quality. It's your responsibility to see that this is done.

Sincerely,
K. Selivanoff Parker

cc: Roger Machnick
Gary Zimmerman
Beth Bland
Charles Henry
Ron Dunlap
Paul Barden
Hamilton Underwood
Betty Luntz
Cheri Zehner
Highline Times
Seattle Times
P.I.

Response to K. Selivanoff Parker Letter of February 25, 1981

1. See General Response Number 1.

2. The cited letter from Roy Ellerman, addressed to Bruce McKnight of Southwest Suburban Sewer District, was referring to the question of whether the East Passage area could be considered "open ocean". If it could, federal requirements for secondary treatment that existed at that time might have been waived. The letter's conclusion was that, since water circulation characteristics of the area prevented its classification as "open ocean", secondary treatment was necessary for any sewage treatment plant receiving federal funding. Effluent from the Renton treatment plant will receive secondary treatment.

3. See Response Number 1 to City of Normandy Park letter.

4. See General Response Number 8.

5. See General Response Number 1.

6. See Response Number 12 to Puget Sound Water Quality Committee letter.

7. See General Response Number 2.

8. Alternatives which continue discharge to the Duwamish River are not considered to fully protect water quality and fisheries.

8. See Response Number 11 to Mary Ellen Hamblin letter.